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# Lessons Learned from Analyses of the Improved TOW Vehicle with Implications for Future Systems

Joel D. Schendel  
HAY Systems, Inc.

January 1990



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procedures. However, because of its experimental nature, some of the procedures that were employed were not standard ECA procedures. (SD)

The results provided a basis for explaining the discrepancy between the results of the USAIS (1987) ECA and other source data. They also suggested several means for improving the information derived from recommended ECA data sources without changing the basic analytic methods. Key results were as follows:

(a) Soldiers who received rating materials that included task descriptions generally showed less variability in their ratings than soldiers who received rating materials that did not include these descriptions. Soldiers provided task descriptions also showed lower mean ECA task ratings than soldiers not provided these descriptions. As a result, soldiers in the former groups tended to rate fewer tasks as high drivers than soldiers in the latter groups.

(b) Eight tasks were rated as high driver tasks. An additional task was included in the list of high drivers during the ECA validation process. Five of these nine tasks were operator maintenance tasks.

(c) Data generally supported the need to include consideration for crew-level collective tasks in some type of front-end analysis like ECA.

(d) Approximately 5 to 7 years of relevant experience appears to be the minimum required for raters to appreciate the seriousness of system-related problems or to report them as serious problems.

(e) In terms of types of problems reported, there was a clear trend for soldiers in operational units to show greatest concern for problems associated with task performance and forgetting. There was an equally clear trend for instructors to show greatest concern for problems associated with learning and training.

(f) Incorporating a fifth response alternative for ratings on which soldiers had no opinion or did not know how to respond was a way to limit guessing and to identify tasks that are unfamiliar or infrequently performed.

(g) Collecting data on tasks (ECA) and on human factors engineering, system safety, and health hazards issues provided a clearer picture of the problems affecting the ITV than either type of data can provide by itself. Once these data were analyzed, it became apparent why the USAIS (1987) ECA did not indicate certain problems with the ITV. ECA focuses on manpower, personnel, and training issues. It does not provide for the direct assessment of human factors engineering, system safety, and health hazards issues.

(h) Desired Features Analysis was developed as a means of collecting information about the best or most desirable design features of the predecessor system, the best or most desirable features of systems related to the predecessor system, and ideas for improving the design of the follow-on system. Based on the quality of the input received, the approach appears to have merit.

# U.S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES

A Field Operating Agency Under the Jurisdiction  
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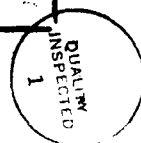
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**Technical Report 869**

# **Lessons Learned from Analyses of the Improved TOW Vehicle with Implications for Future Systems**

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## FOREWORD

This report describes research involving a partial Early Comparability Analysis (ECA) on the M901/M901A1 Improved TOW (tube-launched, optically tracked, wire-guided missile) Vehicle (ITV). The present research grew out of an ECA performed by the U.S. Army Infantry School (USAIS), Fort Benning, Georgia (USAIS, 1987). The results of the analysis appeared inconsistent with user-sponsor input and related test report data. One purpose of this research was to identify the source of the discrepancy between the ECA and other source data. A second purpose was to determine ways of enhancing the information generated from recommended data sources. No attempt was made to examine all recommended data sources. Instead, the primary focus was placed on SME opinion, a major source of ECA data.

ECA is an important front-end analytic technique and a key element in the overall manpower and personnel integration (MANPRINT) program. ECA uses a "lessons learned" approach to aid in replacing or improving existing equipment. ECA focuses on the individual soldier tasks performed by operators, maintainers, and repairers associated with the existing equipment (referred to as the "predecessor system") and tries to identify problems in the equipment and to avoid them in follow-on systems. Every effort was made not to change fundamental ECA procedures. However, because of its experimental nature, some of the procedures used in this research were not standard ECA procedures.

The Army Research Institute for the Behavioral and Social Sciences (ARI) Fort Benning Field Unit conducts research on training and training technology with emphasis on individual and small-team skills in the infantry arena. The research task that supports this mission, "Developing Training for Individual and Crew-Served Weapons," is organized under the "Train the Force" program area.

The U.S. Army Soldier Support Center--National Capital Region (SSC-NCR) is the proponent for ECA. The results of this research were presented to representatives of SSC-NCR, and several of the recommendations have been adopted for use in recent ECAs. Findings and recommendations related to the ITV were presented to representatives of USAIS, U.S. Army Training and Doctrine Command (TRADOC) System Manager Antitank Missiles, and will be used to improve the design of future infantry systems.



EDGAR M. JOHNSON  
Technical Director

# LESSONS LEARNED FROM ANALYSES OF THE IMPROVED TOW VEHICLE WITH IMPLICATIONS FOR FUTURE SYSTEMS

## EXECUTIVE SUMMARY

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### Requirement:

Early Comparability Analysis (ECA) is an important manpower and personnel integration (MANPRINT) front-end analytic methodology. It uses a "lessons learned" approach, focusing on the individual soldier tasks performed by operators, maintainers, and repairers of an existing system (referred to as the "predecessor system"). The intent of the analysis is to identify those tasks that are particularly resource intensive and to eliminate them in the successor system. The present research grew out of an ECA performed by the U.S. Army Infantry School (USAIS) on the Improved TOW (tube-launched, optically tracked, wire-guided missile) Vehicle (ITV) (USAIS, 1987). The results of the analysis appeared inconsistent with user-sponsor input and related test report data. This report describes research accomplished as part of a partial follow-on ECA on the ITV. This research was designed to identify the source of the discrepancy between the ECA and other source data, and to determine ways of enhancing the information generated from ECA data sources. No attempt was made to examine all recommended data sources. Instead, the primary focus was placed on SME opinion since it is a major source of ECA data.

### Procedure:

In performing this research, a broad approach was taken to look for insights to issues that appeared worthy of raising. The research was designed to (a) assess the utility of having task rating materials that include brief task descriptions; (b) address selected crew-level collective tasks; (c) facilitate consideration for the conditions under which operator tasks may be performed; (d) gain a better understanding of the value of using subject matter experts (SMEs) with different types and amounts of experience; (e) limit guessing during the task rating process; (f) assess the value of a forced-choice method in providing for the early verification of problems (or "high driver") tasks; (g) develop an approach for treating human factors engineering, system safety, and health hazard issues; and (h) collect information on the desired features of the system. The ECA itself entailed collecting rating data on 61 ITV operator tasks. Ratings were accomplished by three different soldier populations (line unit crews, instructors, and initial entry soldiers). Every effort was made not to change fundamental ECA procedures.

However, because of its experimental nature, some of the procedures employed in this research were not standard ECA procedures.

#### Findings:

The research provided a basis for explaining the discrepancy between the results of the USAIS (1987) ECA and other source data. The discrepancy appeared attributable to the fact that ECA addresses manpower, personnel, and training (MPT) issues. It does not provide for the direct assessment of human factors engineering, system safety, and health hazard concerns. The research suggested several means for improving the information gained from recommended ECA data sources without changing the basic methodology. The research also identified significant problems affecting the ITV, most of which were documented in early operational test reports. Other key results were as follows:

(a) Soldiers who received rating materials that included task descriptions generally showed less variability in their ratings than soldiers who received rating materials that did not include these descriptions. Soldiers provided task descriptions also showed lower mean ECA task ratings than soldiers not provided these descriptions. As a result, soldiers in the former groups tended to rate fewer tasks as high drivers than soldiers in latter groups.

(b) Eight tasks were rated as high driver tasks. An additional task was included in the list of high drivers during the ECA validation process. Five of these nine tasks were operator maintenance tasks.

(c) Data generally supported the need to include consideration for crew-level collective tasks in some type of front-end analysis like ECA.

(d) Approximately 5 to 7 years of relevant experience appears about the minimum for raters either to appreciate the seriousness of system-related problems or to report them as serious problems.

(e) In terms of types of problems reported, there was a clear trend for soldiers in operational units to show greatest concern for problems associated with task performance and forgetting. There was an equally clear trend for instructors to show greatest concern for problems associated with learning and training. These are reasonable biases given these individuals' unique job responsibilities and the nature of the difficulties they are likely to encounter in responding to them.

(f) Incorporating a fifth response alternative for ratings on which soldiers had no opinion or did not know how to respond

appeared to be an effective way to limit guessing and to identify tasks that are unfamiliar or infrequently performed.

(g) Desired Features Analysis was developed as a means of collecting information about the best or most desirable design features of the predecessor system, the best or most desirable design features of systems related to the predecessor system, and ideas for improving the design of the follow-on system. Based on the quality of the input received, the approach appears to have merit.

#### Utilization of Findings:

Findings and recommendations related to conduct of the ECA were presented to the proponent--U.S. Army Soldier Support Center--National Capital Region (SSC-NCR). Several of these recommendations have been adopted for use in ongoing analyses. Additionally, the report includes discussion of findings having general applicability for the design of armored combat vehicles. Recommendations developed from these data can be used to assist in the design of related, future systems.

# LESSONS LEARNED FROM ANALYSES OF THE IMPROVED TOW VEHICLE WITH IMPLICATIONS FOR FUTURE SYSTEMS

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**LESSONS LEARNED FROM  
ANALYSES OF THE IMPROVED TOW VEHICLE WITH  
IMPLICATIONS FOR FUTURE SYSTEMS**

**Introduction**

**Overview**

Army Regulation (AR) 602-2, the official manpower and personnel integration (MANPRINT) regulation, was first published in April 1987. This regulation has led to increased visibility for manpower, personnel, and training (MPT) issues early in the acquisition process. It has significantly upgraded and strengthened requirements for MPT considerations in procurement documents. It also has resulted in the development and application of new methods to improve system performance and enhance the estimation of MPT resources associated with new systems. Early Comparability Analysis (ECA) is one of these methods.

This report includes an example of a partial ECA. The ECA was performed using 61 M901/M901A1 Improved TOW (tube-launched, optically tracked, wire-guided missile) Vehicle (ITV) operator tasks, following an analysis performed earlier by the U.S. Army Infantry School (USAIS), Fort Benning, Georgia (USAIS, 1987). The report also includes research which was accomplished in conjunction with the ECA. In performing this research, every effort was made not to change fundamental ECA procedures. However, because of the experimental nature of the work, some of the procedures that were employed were not standard ECA procedures.

**Early Comparability Analysis.** ECA is intended specifically to aid in the replacement or improvement of existing equipment. In ECA terms, the existing equipment is referred to as the predecessor system. ECA uses a "lessons learned" approach to the design of a conceptual system. Effort is directed toward identifying problems in the predecessor system and avoiding them in the conceptual system. If no single predecessor system exists, comparisons are based on components from several operational systems. These operational systems are called "reference systems."

The ECA methodology focuses on the individual soldier tasks performed by operators, maintainers, and repairers of predecessor systems, reference systems, or both. This includes all critical and noncritical tasks, not considering collective tasks (requiring more than one crew member to perform) or supervisory/managerial tasks. The intent is to identify and limit those tasks which consume inordinate amounts of MPT resources. For

example, these tasks might be ones which are particularly difficult to train, learn, perform, or remember. These MPT resource-intensive tasks are referred to as "high-drivers."

ECA is a 12-step process. These 12 steps are detailed in the Early Comparability Analysis (ECA) Procedural Guide which was prepared by the US Army Soldier Support Center - National Capital Region (SSC-NCR) (USASSC-NCR, 1987). The steps are summarized in Appendix A.

**Purpose and scope.** The present research grew out of an earlier ECA (USAIS, 1987) that included consideration for the ITV. The ITV is the standard armored personnel carrier modified by the addition of a turret and a hydraulically-erected dual TOW launcher (Figure 1). The system was designed to allow TOW squads mobility with light armor protection against small arms fire and artillery fragments. The four-man ITV squad (mechanized infantry five-man scout squad in armored cavalry and armor/mechanized scout platoons) consists of a squad leader (or section leader), gunner, driver, and loader. A more complete description of the ITV operational characteristics, crew activities, and tactical applications can be found in FM 23-34, Improved TOW Vehicle (Department of the Army, 1987b) and TM 9-2350-259-10, Operator's Manual for Combat Vehicle, Anti-Tank, Improved TOW Vehicle, M901 (Department of the Army, 1979).

The USAIS (1987) ECA included a total of 129 ITV operator tasks and subtasks. ECA ratings were based on subject matter expert (SME) input. Only two tasks had ECA task ratings high enough to qualify them as "high driver," or problem tasks. These tasks were "Perform Preventive Maintenance Checks and Services" and "Operate Vehicle."

The virtual absence of high driver tasks on the ITV was unexpected. Developed in the late 1970s, the ITV has always been regarded as an interim system. Concerns related to the deficiencies of the ITV design for combat have been voiced by the system proponent and have been raised repeatedly in test reports and training analyses that include MPT, human factors engineering, system safety, and health hazards data (e.g., Hammond & Redden, 1984; Smith, Thompson, & Nicolini, 1980).

Given the apparent discrepancy between the results of the ECA, user-sponsor input, and test report data, it was decided to perform a follow-on ECA on the ITV. As part of this effort, special consideration was given to the analysis itself. Questions to be answered during the research included the following:

- What accounts for the discrepancy between the results of the USAIS (1987) ECA and other source data?

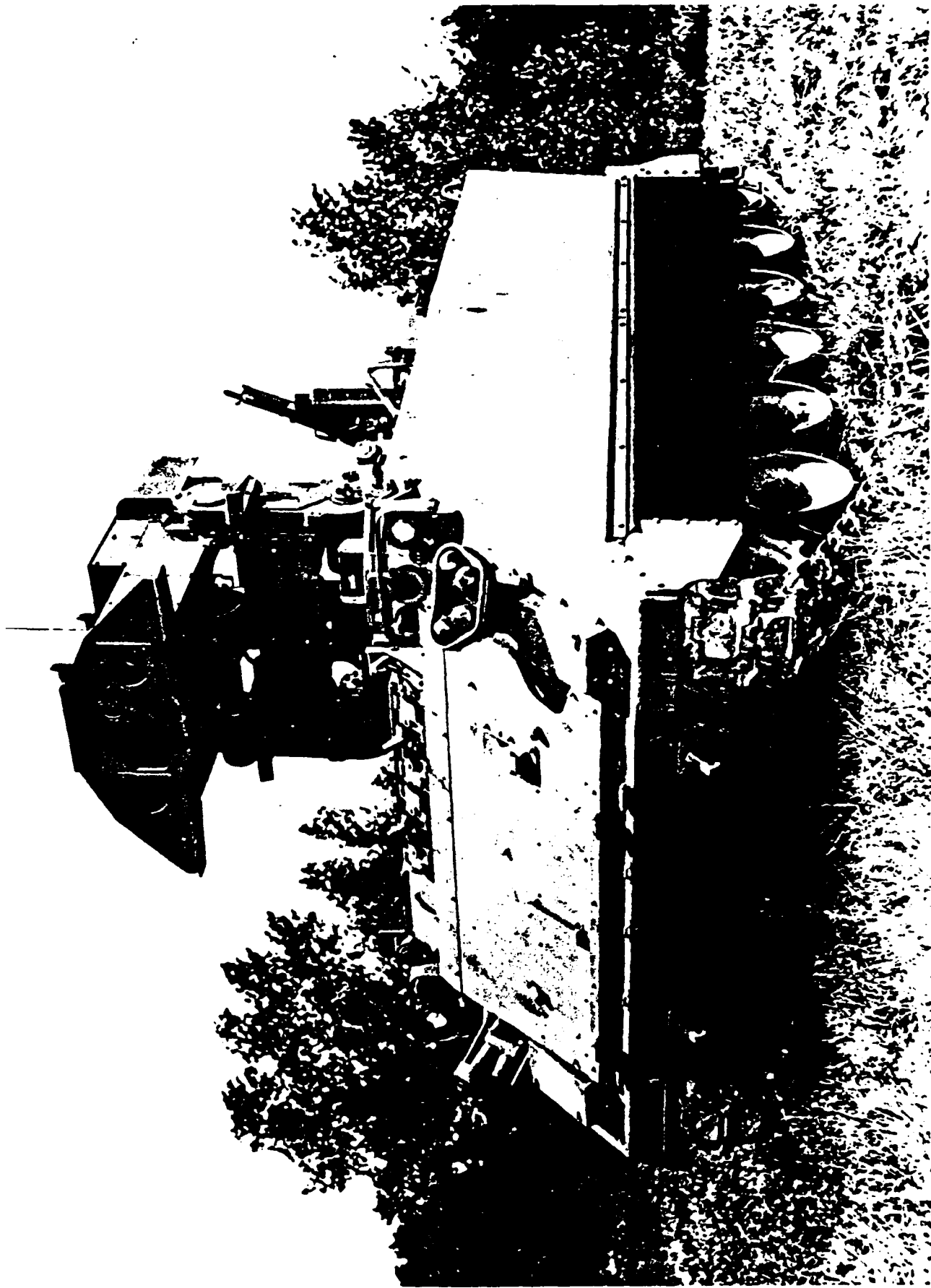


Figure 1. The Improved TOW Vehicle shown with elevated dual-TOW missile launcher.

- Should new front-end analytic methods be recommended for use in addition to the current ECA procedure?
- If yes, what methods? How affordable are these methods given demands on existing in-house MANPRINT resources?

A second purpose of this research was to determine ways of enhancing the information derived from recommended ECA data sources. These data sources are listed by USASSC-NCR (1987). No attempt was made to examine all recommended data sources. Instead, the primary focus was placed on SME opinion since it is a major source of ECA data.

### **Approach**

A broad approach was taken toward this research. Insights were sought on issues which appeared worthy of raising. These issues are described in the following paragraphs.

**Describing tasks.** ECA uses task titles as the basis for highlighting critical resource issues. One advantage of this approach is that it is universal. Tasks provide a "common language" across systems. However, without additional information on the task, problems may arise in how soldiers define or treat tasks. For example, a task title may be viewed as including steps "a," "b," and "c" by some raters, "a" and "b" by other raters, and "b," "c," and "d" by other raters. If this occurs, the effect would be to add unwanted variability to the rating data and may reduce the likelihood of identifying high driver tasks.

In this research, task descriptions were included as an independent variable. Tasks and task descriptions appear arranged by duty position (squad leader, gunner, driver, loader) and vehicle subsystem (automotive, turret, weapons, communications) in Appendix B. It was hypothesized that if task descriptions have significant utility, soldiers provided these descriptions should be better able to rate tasks than soldiers not provided these descriptions. Furthermore, this should hold true regardless of whether or not the task is a problem task. Testing this hypothesis involved examining the variability of individual task ratings, where soldiers either were provided task descriptions or were not provided descriptions. It also involved assessing the overall impact of task descriptions on task ratings. This assessment entailed determining if soldiers with task ratings generally had higher (or lower) ECA task ratings across tasks and if rating conditions interacted in some systematic way with tasks.

**Addressing crew-level collective tasks.** ECA only addresses individual tasks. It does not address crew-level collective

tasks. The term "crew-level collective task" refers to a unit of work requiring more than one crew member for its completion. A possible problem in not addressing crew-level collective tasks is that these tasks may account for a relatively high proportion of high drivers, especially considering the numbers of personnel involved and the interactive nature of their performances.

Selected crew-level collective tasks were considered for experimental purposes. They were engaging a target, reloading the TOW launcher (ITV), performing misfire/hangfire procedures (ITV), performing emergency action procedures (ITV), and performing emergency evacuation from the ITV. Most of these tasks were drawn from the Army Training and Evaluation Program (ARTEP) 7-91-Drill, Battle Drills for the Antiarmor Platoon (Department of the Army, undated). Although these tasks were selected for research purposes, they do not exhaust all possible crew-level collective tasks. Primary interests were in determining whether raters had any special difficulties in dealing with crew-level collective tasks, and whether raters would regard a disproportionately high number of these tasks as high driver tasks.

Addressing operator tasks. The ECA normally addresses all types of tasks associated with a predecessor system, to include operator, maintainer, and repair tasks. This research only addressed operator tasks. The intent was to keep the focus consistent with the focus of the USAIS (1987) ECA.

One possible reason for the lack of high driver tasks on the USAIS (1987) ECA is because raters did not account for the range of conditions under which operator tasks may have to be performed. Maintainer and repair tasks, generally, are accomplished under relatively stable environmental conditions. This is not necessarily the case for operator tasks, which frequently are performed under extreme conditions of weather, visibility, fatigue, and so on. In an effort to raise raters' awareness of the effect that changes in the operational environment can have on task performance, the following sentence was added to the definition of Task Performance Difficulty that appears in USASSC-NCR (1987, p. 9) and in Appendix A:

In rating Task Performance Difficulty, assume that the task is being performed under conditions which typically are present in field and combat environments (e.g., cold or hot weather, limited visibility, fatigue, stress).

All rating booklets included this sentence. It was not treated as an independent variable.

Developing a sample of raters. ECA depends heavily on SME input. USASSC-NCR (1987) defines an SME as follows:

Usually a noncommissioned officer who has extensive 'hands on' experience with the studied equipment, recent unit experience and a background as a trainer/training developer. (p.10)

Raters were drawn from three soldier populations. Two of these populations included soldiers that met the USASSC-NCR(1987) definition of an SME. One did not. The former soldier populations were composed of ITV infantry one-station unit training (OSUT) instructors and table of organization and equipment (TOE) unit soldiers. The latter soldier population was composed of infantry OSUT soldiers who had just completed instruction on the ITV. OSUT soldiers become qualified for the military occupational specialty (MOS) 11H (Heavy Antiarmor Weapons Infantryman) after approximately 7 weeks of the first phase of OSUT and 40 hours of instruction in TOW gunnery (ground mount). Selected soldiers then go on to receive 80 hours of instruction on the ITV. Those soldiers successfully completing ITV training are awarded the additional skill identifier E9. OSUT at Fort Benning is the primary E9-producing site in the Army.

There were two key reasons for drawing raters from different soldier populations. One reason was to lend breadth and depth to the sample. TOE unit soldiers and instructors have different perspectives on problems. What may be a significant problem for one may not be a problem for the other. Soldiers in institutions must teach soldiers to perform tasks under a given set of conditions and to a set standard. Soldiers in units are operationally oriented and mission driven. As a consequence, tasks which are regarded as problems in institutions may not be regarded as problems in units. The reverse also is true. Additionally, tasks occasionally are performed differently from institution to unit and from unit to unit.

The other reason was to gain a better understanding of the utility of using selected soldiers to provide specific types of input. For example, OSUT soldiers may have better insights into training/learning problems on specific tasks than either instructors or TOE unit soldiers. On the other hand, it also is possible that quality of input depends most directly on types and amounts of experience with a system. Under this assumption, no OSUT soldiers and only some instructors and line unit soldiers may be capable of providing meaningful input to an ECA.

Limiting guessing. An effort was made to have soldiers rate only those tasks on which they had firsthand experience. This technique was seen as a means to help limit guessing and, thereby, enhance the accuracy and reliability of ratings. Toward this end, OSUT soldiers rated only tasks that instructors indicated were ones which they should know. Similarly, TOE unit soldiers all rated tasks associated with their particular duty positions. No one rated tasks outside his duty position. In other words, squad leaders rated squad leader tasks and no other

tasks. The same was true for gunners, drivers, and loaders. This approach was tried given limits on the numbers of ITV squad leaders available for this research, and given the assumption that soldiers serving in a duty position are in a unique position to identify problems affecting that particular position. It also was seen as a means of limiting the number of tasks that any particular rater had to consider. Requiring raters to respond to a large number of tasks can induce fatigue and reduce motivation. This poses problems because poorly motivated raters tend to select the center or neutral alternatives with rating scale items (e.g., Dyer, Matthews, Wright, & Yudowitch, 1976).

As an added measure against guessing, a fifth response alternative was added to the standard ECA four-point scale. It read:

"5 = NO OPINION...DON'T KNOW"

This response alternative was included for experimental purposes. Data were analyzed on the frequency and distribution of "NO OPINION...DON'T KNOW" responses.

#### **Providing for the early verification of high driver tasks.**

As indicated in Appendix A, ECA affords SMEs the opportunity to rate tasks using six criteria and uses these ratings along with data obtained from other sources to generate an ECA task score. Tasks that score 216 or higher (six criterion values) or 90 or higher (five criterion values) are regarded initially as high drivers. Once the task scores have been computed, USASSC-NCR (1987) recommends that they be verified by SMEs. If discrepancies exist between the task scores and SME input, the combat developer is responsible for determining if a task is or is not a valid high driver. From an SME's perspective, ECA uses an "indirect" method for establishing tasks as high drivers: High drivers are identified through ratings and calculations based on those ratings. Only later are the results of these calculations verified directly by SMEs.

Part of this research was aimed at assessing the utility of including a second, more direct method for establishing tasks as high drivers. The main idea was to try to provide a kind of "early verification" of ECA results and to surface tasks as potential high drivers even if they did not rank high on all ECA task scales. In addition to having soldiers rate tasks using the six ECA rating scales, selected soldiers also rated tasks using a two-alternative, forced-choice method. The forced-choice rating required the soldier to indicate if a task was or was not a problem task. The term problem task was defined as a task that requires too much time, energy, knowledge, skill, and ability to perform to standard or which poses unnecessary safety or health hazards. If a soldier rated a task as a problem task, he also was to provide a brief explanation for this rating.

There was a second reason for having some soldiers rate tasks using the two-alternative, forced-choice method. This was to test the hypothesis that a forced-choice format may be as effective in identifying high driver tasks as the standard ECA methodology. Recognizing the preliminary nature of this research, two groups of OSUT soldiers were used as subjects. (OSUT soldiers were used because of the lack of available instructors and TOE unit soldiers.) One group rated tasks using only the forced-choice method; the other group rated the same tasks using only three ECA task scales. Analyses entailed assessing the extent to which ratings in the first group correlated with ratings in the second group.

To avoid confusion, it should be pointed out that the only groups that rated tasks using either the ECA procedure or forced-choice procedure were composed of OSUT soldiers. Other OSUT soldiers, instructors, and TOE unit soldiers rated tasks using both the ECA procedure and forced-choice procedure.

Treating human factors engineering, system safety, and health hazard issues. ECA does not deal specifically with human factors engineering, system safety, or health hazard issues. This is not a shortfall of ECA. ECA was designed to address MPT issues.

The problem is that no current analysis of to-be-replaced systems, that is not both technically oriented and labor intensive, is known to capture critical human factors engineering, system safety, and health hazard issues. These data are developed on new systems as part of the MANPRINT Assessment process (AR 602-2, DA, 1987a). But they normally are not developed on existing systems. Unless a special effort is made to capture these data, or unless information gathered in an ECA happens to suggest a particular problem, important lessons learned from the operators, maintainers, and repairers of to-be-replaced systems may not be transferred to the designers of the follow-on systems. At least no formal mechanism exists to assure that this transfer occurs.

How can human factors engineering, system safety, and health hazards considerations be taken into account without a technically oriented, in-depth analysis or without fundamentally altering ECA? The approach involved three basic steps:

1. obtaining firsthand experience with the system in question;
2. obtaining copies of accident and test reports and analyzing them for critical human factors engineering, system safety, and health hazards issues;



3. obtaining the reactions of current users and instructors to the reported concerns about the system and asking them for input on the types of injuries they had sustained and the types of system-related equipment they had accidentally broken or damaged while working in and around the ITV.

As part of this research, the principal investigator spent time trying out equipment, performing tasks, and watching soldiers perform tasks on the ITV. The goal in obtaining firsthand experience with the ITV was to achieve some perspective on the system and the tasks operators are expected to perform.

Human factors engineering, system safety, and health hazards issues were drawn primarily from early test reports and related documents on the ITV. Most issues were drawn from questionnaire items developed previously by Smith, Thompson, and Nicolini (1980). Several of the issues were developed around potential safety concerns. These concerns were identified by analyzing accident reports associated with the use of the ITV (1982 - 1988). These reports were made available by the U.S. Army Safety Center (USASC), Fort Rucker, Alabama (USASC, 1988). In analyzing these test and accident reports, a list of 177 specific issues was generated for further evaluation.

The primary purpose in obtaining the reactions of current users and instructors was to assess the continuing relevance of the human factors engineering, system safety, and health hazards issues for soldiers. Concerns raised during operational testing may be corrected before or early after fielding and, consequently, may no longer cause problems. On the other hand, concerns that were not corrected may still pose significant problems. Gathering data about these concerns adds information which can be used to improve the design of the follow-on system. The same is true for data related to the types of injuries soldiers had sustained and data related to the types of system-related equipment they had accidentally broken or damaged while working with the ITV.

A related consideration in collecting these data was to try to account for the discrepancy between the results of the USAIS (1987) ECA, user-sponsor input, and the test report data. Task ratings used in conjunction with task and learning analyses are useful in identifying tasks that stand out as sources of concern from an MPT perspective. But task ratings cannot tell the whole story. The rest of the story depends on the capture of data encompassed by the human factors engineering, system safety, and health hazards domains.

Collecting information on the desired features of the system. MANPRINT analyses tend to be oriented toward avoiding system design problems. Given this orientation, they tend to

focus on what is wrong with an existing system and to overlook what is good or desirable about it.

Two of the biggest problems faced by developers of new systems is knowing what to ask for in the system and knowing how to ask for it. To help overcome these problems, information was collected on the best features of the ITV and ITV training. Soldiers also were asked for their ideas about how the system could be improved. This was done for experimental purposes to assess the utility of the approach as a means of providing useful input to the design of a new system.

## **Method**

### **Soldiers**

**TOE unit soldiers.** TOE unit soldiers were 16 heavy antiarmor weapons infantrymen (MOS 11H). Fourteen were drawn from the same four ITV squads. The other two soldiers were members of the same battalion but were drawn from other ITV squads. Four currently were serving as squad leaders, four were serving as gunners, four were serving as drivers, and four were serving as loaders.

**Instructors.** The eight instructors who provided input to this analysis were from USAIS. All had 11H as their primary MOS.

**OSUT soldiers.** Twenty OSUT soldiers provided input to this analysis. All of these soldiers had completed the first phase of their initial MOS-producing training in infantry OSUT at Fort Benning. They then had received 40 hours of instruction covering the use of TOW (ground mount) followed by 80 hours of instruction on the ITV. Data collection occurred immediately after the soldiers had successfully completed the 80 hours of instruction on the ITV.

### **Data Collection Procedures**

**TOE unit soldiers.** TOE unit data were collected on two days in March 1989. Two crews were scheduled on Day 1, and two crews were scheduled on Day 2. All data collection occurred in a motor pool area. Two ITVs were made available during data collection, and most soldiers sat inside the ITVs as they provided their written input. Having the ITVs available allowed soldiers to demonstrate the performance of selected tasks and to point out human factors and safety concerns with the vehicle. The vehicles also provided effective means for prompting soldiers' memories about specific tasks or features on the vehicle.

All soldiers first were given background information on the data collection effort. Background information was presented to soldiers both orally and in writing (Appendix C). Experience data then were collected (Appendix D). These data were collected to gain a better understanding of the experiential base of the SME pool.

All soldiers then rated selected individual and crew-level collective operator tasks. Most of the individual tasks used for this analysis were drawn from the career management field (CMF) 11 task list (USAIS, 1988). This list was approved following the USAIS (1987) ECA and defines ITV tasks differently (generally broader scope) than 1987 USAIS list. The crew-level collective tasks were drawn from ARTEP 7-90-Drill, Battle Drills for the Antiarmor Platoon (Department of the Army, undated), and the ITV OSUT program of instruction (USAIS, 1985). All tasks, both individual and crew-level collective, were selected in coordination with USAIS representatives and confirmed by ITV instructors.

In completing the ECA ratings, half of the soldiers in each duty position rated tasks that included task descriptions (see Appendix B); the other half rated tasks that did not include task descriptions. Thus, two squad leaders rated tasks that included task descriptions, and two squad leaders rated tasks that did not include task descriptions. The same was true for gunners, drivers, and loaders. During Day 1, one squad was randomly selected to receive the materials that included task descriptions. The same was true during Day 2.

Most task descriptions were developed around information contained on job and task analysis worksheets (U.S. Army Training and Doctrine Command, 1980), which were supplied by USAIS. In cases where these forms were not available, task descriptions were developed using the documents identified in Appendix E and input from SMEs. These SMEs included experts and instructors from USAIS.

Soldiers rated tasks relevant only to their particular duty positions. Squad leaders rated the 16 squad leader tasks and five crew-level collective tasks. Gunners rated the 11 gunner tasks, drivers rated the 20 driver tasks, and loaders rated the nine loader tasks. Sixty-one tasks were rated overall. These 61 tasks subsumed all tasks and subtasks included in the USAIS (1987) ECA that were deemed relevant to the analysis.

All crew members rated tasks using the six ECA scales: Percent Performing, Task Performance Difficulty, Frequency Rate, Task Learning Difficulty, Time to Train, and Decay Rate. Definitions of each rating scale were provided to assist soldiers

in their ratings (Appendix F). Oral clarification of rating requirements was provided as needed.

After the soldiers had rated tasks using the six ECA rating scales, they then rated the same tasks a second time using a two-alternative, forced-choice approach. Soldiers were instructed as follows:

The same tasks you rated earlier appear on the pages that follow. Please review each task one more time from a total system perspective. Then indicate if you think the task 'is' or 'is not' a problem task. The term problem task is used here to refer to tasks that require too much time, energy, knowledge, skill, and ability to perform to standard or which pose unnecessary safety or health hazards. If you believe that a task 'is' a problem task, please explain why in the space provided.

Two examples of this type of rating form are presented at Appendix G. One of the examples includes a task description; the other does not.

On completing the task ratings, soldiers responded to the human factors engineering, system safety, and health hazards issues. Soldiers responded to each issue by selecting one of the following response alternatives:

- |                      |                            |
|----------------------|----------------------------|
| 0 = no problem       |                            |
| 1 = minor problem    | (something COULD be done)  |
| 2 = moderate problem | (something SHOULD be done) |
| 3 = serious problem  | (something MUST be done)   |

As during the task ratings, squad leaders, gunners, drivers, and loaders all rated issues peculiar to their particular duty positions. There were 26 squad leader issues, 33 gunner issues, 26 driver issues, and 17 loader issues. Additionally, all soldiers rated 75 common crew issues.

On completing these ratings, soldiers responded to a question regarding the "Best Features" of the ITV and ITV training (Appendix H). Soldiers were asked to write their answers about the ITV under the category headings of automotive, turret, weapons, and communications. Space also was provided to enable soldiers to address the best features about ITV training.

After completing all rating materials, soldiers met individually with the investigators. The purpose of these meetings was to assure that materials had been completed as instructed and that no data were missing. It also provided investigators the opportunity to seek clarification on confusing or ambiguous input.

Following these meetings, investigators met with soldiers as a group. Soldiers were asked to provide feedback on accidental injuries experienced in or around the vehicle and accidental damage to equipment that may have resulted from the design of the equipment or task requirements.

**Instructors.** The same basic approach employed with the TOE unit soldiers was employed with the instructors. Data collection occurred over a period of two days. The instructors completed their ratings as their training schedules allowed. Since these instructors were engaged in ITV training, they had full access both to ITV turret trainers and actual ITVs during the rating process.

Instructors were given background information on the effort both orally and in writing (Appendix C). They then were asked to provide information on their background experience with the ITV (Appendix D). The background experience questions were tailored to these soldiers' work as instructors, so they differed in several respects from those used with the TOE unit soldiers. For example, instructors were asked how long they had served as an ITV instructor and not asked about their current duty position, length of time in current duty position, or whether they had ever served as an ITV instructor.

Unlike the TOE unit soldiers, instructors rated all 61 tasks, not just tasks associated with a particular duty position. Like the TOE unit soldiers, half the instructors rated tasks that included task descriptions. The other half rated tasks that did not include task descriptions. Instructors were randomly assigned to rating conditions. All instructors first rated the tasks using the six ECA scales. They then rated the tasks a second time using the forced-choice (problem task versus not a problem task) methodology described earlier. All tasks were arranged by duty position (squad leader, gunner, driver, and loader). Within each duty position, tasks were subdivided by subsystem (weapons, turret, automotive, and communications).

After completing the task ratings, instructors responded to the human factors engineering, system safety, and health hazards issues. As during the task ratings, instructors responded to all 102 duty position issues, not just issues associated with one particular duty position. They also rated all 75 common crew issues. Instructors then responded to the question about the best features of the ITV and ITV training.

After completing all rating materials, instructors met individually with the investigators. As with the TOE unit soldiers, these meetings were designed to assure that materials had been completed as instructed and that no data were missing.

**OSUT soldiers.** OSUT soldier data were collected on a single day, with all soldiers having just completed ITV training. OSUT soldiers completed their ratings individually while sitting as a group on bleachers.

Like the TOE unit soldiers and instructors, the OSUT soldiers first were given background information on the effort both orally and in writing (Appendix C). They then were instructed on the rating procedures. Apart from being asked some general questions about the training they had received, these soldiers were not asked to provide detailed information on their background experience with the ITV.

The OSUT soldiers then rated a select sample of tasks. As specified by the ITV instructors, this sample included only those tasks on which they had been trained. In total, OSUT soldiers rated 34 tasks, including 14 squad leader tasks, 11 gunner tasks, 0 driver tasks, and 9 loader tasks.

OSUT soldiers were divided randomly into four equal groups ( $n = 5$ ). Rating requirements differed in each group. Two groups rated tasks using both ECA (E) and forced-choice (F) methods. One of these groups rated tasks with task descriptions (D) (Group EFD), and the other group rated tasks without task descriptions (ND) (Group EFND). The remaining two groups rated tasks using ECA (Group ED) or forced-choice methods (Group FD), but not both. Both of these groups rated tasks that included task descriptions.

In carrying out the ECA task ratings, OSUT soldiers responded to only three rating scales: Task Learning Difficulty, Task Performance Difficulty, and Time to Train. This is because OSUT soldiers would not be expected to be capable of rating tasks according to Percent Performing, Frequency, or Decay Rate. As defined by USASSC-NCR (1987), OSUT soldiers do not qualify as SMEs.

On completing the task ratings, OSUT soldiers were asked to respond only to the question regarding the best features of the ITV and ITV training. They were not asked to rate human factors engineering, system safety, health hazards issues.

## **Results**

### **Rater Experience**

**TOE unit soldiers.** Of the TOE soldiers interviewed, squad leaders were by far the most experienced with the ITV. Squad leaders all reported between 5 and 7 years experience as ITV crew members. Overall, squad leaders' reported experience averaged

6.1 years. In contrast, 11 of the 12 soldiers in the other three duty positions reported between 9 and 24 months experience as ITV crew members. Overall, reported ITV crew member experience of these soldiers averaged 14.2 months. None of the soldiers had ever been an ITV instructor.

Squad leaders had pay grades of E5 ( $\underline{n} = 3$ ) or E6 ( $\underline{n} = 1$ ). Three had approximately 3 years experience as squad leaders; one had 8 months in this position. All had served in every duty position. All had served as ITV crewmen at the National Training Center (NTC).

The gunners had pay grades of E3 ( $\underline{n} = 1$ ) or E4 ( $\underline{n} = 3$ ). Time as a gunner ranged from 3 to 12 months. Three gunners had served in other duty positions, and one had not. All had served as ITV crewmen at NTC.

All of the drivers had pay grades of E3. Time as a driver ranged from 3 months to 8 months. Three drivers had served previously as a loader, and one had served as a gunner. Two of the gunners had served as ITV crewmen at NTC.

The loaders had pay grades of E3 ( $\underline{n} = 1$ ) or E4 ( $\underline{n} = 1$ ). Time as a loader varied from 1 week to 7 months. Two loaders had served previously as a driver, and one had served in all ITV duty positions. Three of the loaders had served as ITV crewmen at NTC.

**Instructors.** Six of the eight instructors had a pay grade of E6, one had a pay grade of E5, and one had a pay grade of E7. Reported time in service as ITV instructors averaged approximately 2 years and 9 months, and ranged from 6 months to 5 years. Reported time in service as ITV crew members averaged approximately 4 years and ranged from 1 year to 8 years. Only three of the instructors reported having trained as an ITV crewman at NTC.

### **ECA Task Scores**

Soldier task ratings are presented by rating population in Appendix I. This appendix also presents the Army Occupational Survey Program (AOSP) data that were available on specific 11H tasks (USASSC-NCR, 1983a). Questionnaire data collected through AOSP are used to develop and evaluate training and personnel management programs, job descriptions, soldiers' manuals, trainers' guides, and related documents. Additional information on the program may be obtained by consulting the Army Occupational Survey Program Handbook (USASSC-NCR, 1983b).

The AOSP data appear as converted for use with the ECA. In no instance did the combination of soldiers' (TOE unit soldiers

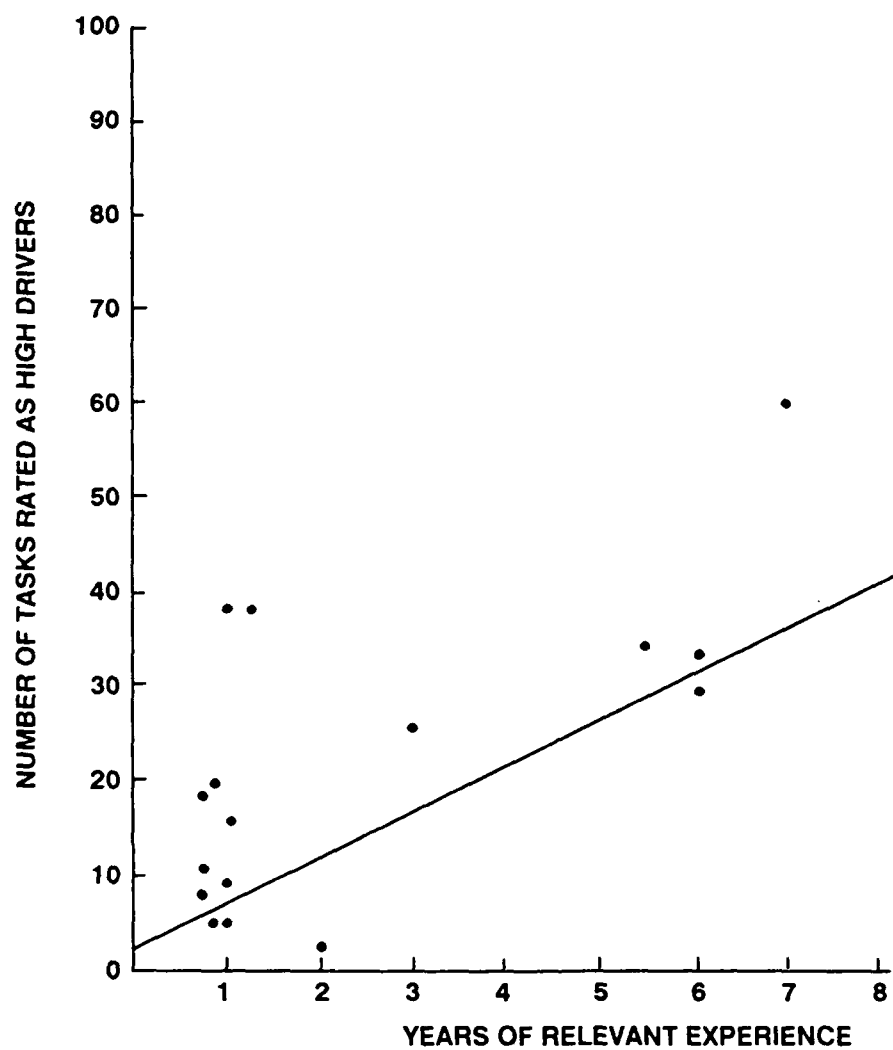


Figure 3. Relationship between number of "Serious Problem" responses to common crew issues for TOE Unit Soldiers and years of relevant experience.



$t(14) = 4.56, p < .01$ . This relationship, described by the linear prediction equation,  $y = .35 + .096x$ , is presented in Figure 3.

For instructors, reported years of relevant experience and number of "3 = serious problem (something must be done)" responses were correlated to all human factors engineering, system safety, and health hazards issues. This we were able to do because instructors responded to all issues. This correlation was not statistically significant,  $r = .36, t(6) = 1.01, p > .05$ . However, the failure to achieve statistical significance may have been affected by the small sample size and the presence of an outlying data point. (When this data point was eliminated,  $r = .66, t(5) = 2.24, p < .05$ ).

The apparent relationship between years of relevant experience and number of "3 = serious problem (something must be done)" responses to common crew issues is interesting and difficult to explain for the same reason. It is not difficult to know when a vehicle is too hot or too cramped. It is not difficult to recognize when an act associated with the operation of a vehicle causes frequent injuries. Yet, our findings suggest that many years of experience with a system may be necessary for a soldier either to appreciate the seriousness of problems or to report problems as "serious problems."

In terms of types of problems reported, there was a clear trend for soldiers in TOE units to show greatest concern for problems associated with task performance and forgetting. There was an equally clear trend for instructors to show greatest concern for problems associated with learning and training. These trends are revealed in Table 5. In 10 of the 12 instances where TOE unit soldiers' average rating on a scale reached 2.5 or higher, those scales were Task Performance Difficulty or Decay Rate. Similarly, in five of the six instances where instructors' average rating on a scale exceeded 2.5, those scales were Task Learning Difficulty or Time to Train.

### Limiting Guessing

One of the ways in which an attempt was made to limit guessing in this research was to add a fifth response alternative (5 = NO OPINION... DON'T KNOW) to each ECA rating scale. To assess the utility of this approach, the number and distribution of "5" responses were examined across all raters and tasks. The intent was to determine if the use of the additional rating scale appeared valid or haphazard.

There were several indications that the use of the additional response alternative was not haphazard. One indication was the apparent relationship between frequency of "5" responses and reported experience with the ITV. As shown in

Table 6, soldiers with more experience had fewer "5" responses than soldiers with less experience. OSUT soldiers had the highest proportion of "5" responses, followed closely by loaders and drivers. In comparison, instructors, squad leaders, and gunners showed relatively few "5" responses. Some of the tasks which were included in the OSUT soldiers' rating booklets are briefed only. Soldiers are given a verbal explanation and demonstration. They are not tested on the tasks nor do they perform them as part of the normal program of instruction. This too can account for the relatively high proportion of "5" responses among OSUT soldiers.

Table 6

Frequency of "5 = NO OPINION...DON'T KNOW" Responses for Individual Raters and Tasks Summed Over Raters and Tasks and by Rater Population

TOE Unit Soldiers		Instructors		OSUT Soldiers	
Number of ECA Scales Marked "5" Per Task	Number of Instances	"5" Responses Per Task	Number of Instances	"5" Responses Per Task	Number of Instances
6	12	6	12	3	68
5	1	5	3	2	2
4	1	4	1	1	3
3	0	3	1	0	7,439
2	5	2	5		
1	13	1	58 <sup>a</sup>		
0	7,216	0	14,474		

<sup>a</sup>One instructor accounts for 47 of this total.

Another indication that the use of the additional rating scale is valid comes from an analysis of individual ratings on each task. In most instances, when a rater marked "5" for a task, he marked it on all six rating scales (three rating scales for OSUT soldiers). As shown in Table 7, this held true across all soldier populations. A reasonable explanation for this pattern of responses is that soldiers lacked experience on these tasks and as a result had no opinion or did not know how to rate them. Support for this interpretation comes from the written comments of raters. Among soldiers who chose to include written comments about specific tasks, tasks marked with all "5s"

frequently included a note indicating that the rater lacked experience performing the task. For example, there were 12 separate instances in which TOE unit soldiers responded to a task with all "5s." Comments such as "never performed task," "never operated," and "no experience" were offered in nine of those instances.

**Table 7**

**Number and Distribution of '5 = NO OPINION...DON'T KNOW' Responses by Soldier Population**

Scale	TOE Unit Soldiers				Instructors <sup>e</sup>	OSUT Soldiers <sup>f</sup>
	Squad Leaders <sup>a</sup>	Gunners <sup>b</sup>	Drivers <sup>c</sup>	Loaders <sup>d</sup>		
Percent Performing	3	1	10	6	16	
Task Performance Difficulty	3	-	7	3	15	66
Frequency Rate	6	-	6	5	72 <sup>g</sup>	
Task Learning Difficulty	3	-	8	4	18	67
Time to Train	4	-	8	5	19	69
Decay Rate	4	-	14	4	26	

<sup>a</sup> $\bar{n}$  = 4; 21 tasks

<sup>b</sup> $\bar{n}$  = 4; 11 tasks

<sup>c</sup> $\bar{n}$  = 4; 20 tasks

<sup>d</sup> $\bar{n}$  = 4; 9 tasks

<sup>e</sup> $\bar{n}$  = 8; 61 tasks

<sup>f</sup> $\bar{n}$  = 15; 34 tasks

<sup>g</sup>One instructor accounts for 75% ( $\bar{n}$  = 54) of this total.

Task descriptions had no effect on the frequency of "5" responses. Numbers of "5s" were split more or less evenly between groups with and without task descriptions, and this held true across soldier populations. There were 53 instances in which TOE unit soldiers with descriptions marked "5" and 51 instances in which TOE soldiers without descriptions marked "5." There were 45 instances in which instructors with descriptions marked "5" and 115 instances in which instructors without descriptions marked "5." While instructors without descriptions had over two times as many "5s" as instructors with descriptions, one instructor among those without descriptions accounted for 62% ( $\bar{n}$  = 71) of the total. Similarly, there were 139 instances in which OSUT soldiers with descriptions marked "5" and 72 instances in which OSUT soldiers without descriptions marked "5." While it would appear that OSUT soldiers with descriptions marked "5" twice as often as those without descriptions, this discrepancy is

Table 8

Number of Soldiers Checking "5 = NO OPINION...DON'T KNOW" on All ECA Scales by Task and Soldier Population

Soldier Population	Number of All "5" Responses	Task
TOE Unit Soldiers		
Squad Leaders	2 1	Perform operator's PMCS on AN/VRC-12 series radio. Fire an M243 or M259 smoke grenade launcher.
Gunners	0	None.
Drivers	2 1 1 1 1	Tow a tracked vehicle. Maintain the electrical system on an M113-series vehicle. Maintain the personnel heater on an M113-series vehicle. Maintain the exhaust system on an M113-series vehicle. Operate the M-19 periscope on an M113-series vehicle.
Loaders	1 1 1	Load an M243 or M259 smoke grenade launcher. Unload an M243 or M259 smoke grenade launcher. Perform misfire procedures on an M243 smoke grenade launcher.
Instructors	3 2 2 1 1 1 1	Perform operator's PMCS on AN/VRC-12 series radio. Maintain the steering system on an M113-series vehicle. Maintain the hydraulic system on an M113-series vehicle. Maintain the electrical system on an M113-series vehicle. Maintain the brake system on an M113-series vehicle. Maintain the transmission system on an M113-series vehicle. Maintain the exhaust system on an M113-series vehicle.
OSUT Soldiers <sup>a</sup>	10 6 6 6 5 5	Operate intercommunications set AN/VIC-1 on a tracked vehicle. Fire an M243 or M259 smoke grenade launcher. Prepare radio set AN/PRC 77 or AN/PRC-25 for operation. Perform misfire procedures on an M243 smoke grenade launcher. Send a radio message. Load an M243 or M259 smoke grenade launcher.

<sup>a</sup>These tasks represent those to which 33% or more OSUT soldiers responded with all "5s."

due to the fact that there were twice as many OSUT soldiers with descriptions ( $n = 10$ ) as soldiers without descriptions ( $n = 5$ ).

An unforeseen advantage of including "5" as a rating scale is that it may allow for the identification of unfamiliar or infrequently performed tasks. Table 8 presents tasks by soldier population which drew the largest numbers of "5" responses across all six ECA rating scales. Reviewing these lists, it quickly becomes apparent which tasks are not understood or are infrequently performed.

### **Early Verification of High Driver Tasks**

Part of this research was aimed at assessing the utility of including a second, more direct method for establishing tasks as high drivers. Using a forced-choice method that required soldiers to indicate if a task was or was not a problem task, we sought to provide early verification of ECA results and to surface tasks as potential high drivers even if they did not rank high on all ECA task scales.

While a forced-choice approach may hold some potential as a means of providing for the early verification of ECA results, this potential was not realized in the present research. Overall, raters tended infrequently to check tasks as problem tasks. As a result, few tasks were found that over 50% of the raters indicated were problem tasks.

More problematic, there were no instances in which a task rated as a high driver also was rated as a problem task. As shown in Table 3, eight tasks were rated as high drivers by soldiers without task descriptions, and four of these tasks also were rated as high drivers by soldiers with task descriptions. However, none of these tasks was rated as a problem task. This also was the case for "Maintain the Turret on the M901 Vehicle," a task which was not rated as a high driver but which was added to the list of high drivers during the ECA validation process.

The only task rated as a problem task by 100% of the TOE unit soldiers who rated it (loaders) was not rated as a high driver. However, the task in question, "Load a Dual Launcher While Mounted on an M901/M901A1 Vehicle," was one of the 15 tasks which received average ratings of 2.5 or higher on at least one of the four ECA scales associated with task difficulty. It had an average rating of 2.5 on the Task Performance Difficulty scale. This result appeared encouraging until it was discovered that none of the other 14 tasks rated 2.5 or higher on one or more of these scales was rated as a problem task by over half of the relevant soldier population. Further, this result was consistent across soldiers with and without task descriptions. In 13 of the 14 instances, the forced-choice markings of raters with descriptions agreed with those of raters without

descriptions. In each case, less than half of the soldiers rated these tasks as problem tasks.

As part of this research, one group of OSUT soldiers (Group FD) rated tasks using the forced-choice method; the other group (Group ED) rated the same tasks using three ECA task scales. The intent was to obtain some preliminary data to assess the extent to which ratings in the first group correlated with ratings in the second group. Unfortunately, the data were ambiguous: Neither group showed any evidence that they regarded any task as a "high driver" or "problem task."

### **Human Factors Engineering, System Safety, and Health Hazard Issues**

Part of the research was aimed at obtaining the reactions of current users and instructors to the continuing relevance of specific human factors engineering, system safety, and health hazards concerns. For the most part, these concerns were raised during the 1970s when the ITV was undergoing operational testing (e.g., Smith, Thompson, & Nicolini, 1980). Other concerns were ones identified by reviewing accident reports, meeting with ITV OSUT instructors, and spending time working with the vehicle. The intent was to determine if serious human factors engineering, system safety, and health hazards issues had been corrected or were still posing significant training and performance problems for soldiers.

A related consideration in collecting these data was to try to account for the discrepancy between the results of the USAIS (1987) ECA, user-sponsor input, and the test report data. The USAIS (1987) ECA suggested that the ITV had few important problems. In contrast user-sponsor input and test report data suggested that just the opposite was the case. Mean ratings assigned to the various human factors engineering, system safety, and health hazards issues appear rank ordered by crew position and rating population in Appendix L.

**Common crew issues.** As shown in Appendix L, none of the common crew issues was regarded as a nonproblem by crews or instructors. In fact, soldiers at all duty positions indicated serious problems with the vehicle. Of the 75 possible common crew issues, the following numbers of issues were reported as serious problems: squad leaders--24; gunners--2, drivers--5, and loaders--21. Instructors reported 24 serious problems.

There was some level of agreement among soldiers about which common crew issues represent the most serious problems. On average, all of the issues regarded as serious problems by soldiers at all duty positions also were regarded as serious problems by instructors.

Many issues regarded as serious problems by soldiers at a particular duty position were not regarded as serious problems by soldiers at another duty position. Similarly, many issues regarded as serious problems by soldiers at a particular duty position were not regarded as serious problems by instructors or vice versa. In total, 30 (40%) different common crew issues were regarded as serious problems by crew members at one or more duty positions. Including instructors' ratings in this count, 37 (49%) different common crew issues were regarded as serious problems. This is a revealing statistic, especially considering the limited number of high driver tasks identified by the same raters. It goes a long way toward explaining the discrepancy between the results of the USAIS (1987) ECA, user-sponsor input, and the test report data. Clearly, MPT and human factors engineering, system safety, and health hazards analyses provide different types of insights into problems affecting a system.

Two issues surfaced as serious problems for TOE unit soldiers at every duty position and the instructors. These were amount of safety/crash padding and malfunctions of heater.

Concerns related to amount of safety/crash padding were noted by all TOE unit soldiers. Padding is virtually absent from the vehicle. This is particularly true in the areas around the turret and the hatches. It is difficult and hazardous to enter or work around the turret. The turret occupies a significant portion of the crew compartment and is a mass of unshielded hard edges, knobs, and hydraulic lines.

The lack of padding around the gunner's hatch makes it impossible to ride and observe in a "pop-hatch" mode in any degree of safety or comfort. Part of the problem is the gunner's seat. If the gunner stands on the seat, he is too high and in danger of falling out and being crushed if the top-heavy ITV should tip over and roll. If he kneels, he has no back support and must be constantly aware of the possibility of inadvertently activating controls on the gunner's control panel behind him. If he stands on the deck, he is too low and the seat is in the way.

During the course of this research, a number of TOE unit soldiers and instructors were interviewed who had scars on the bottom of their chins. There is no way to quantify this observation, but at least two of these soldiers reported sustaining their injuries while operating in a pop-hatch mode from the gunner's seat.

The lack of padding around the loader's hatch also is a problem. Again, it is impossible to observe or to navigate from the cargo hatch with any degree of comfort or safety. This makes the crew especially vulnerable to air attacks from the rear.

The heater is necessary in cold weather operations for personal comfort and for turret operation. The turret hydraulic

system becomes sluggish or inoperative in cold temperatures. Concerns related to malfunctions of the heater were expressed both by TOE unit soldiers (interviewed on a cold, rainy day) and instructors (interviewed on a hot, clear day). The system is easily broken and, once broken, is very slow to be repaired. Hammond (1985) found that soldiers did not know how to shut down the personnel heater. This can lead to malfunctions. One of the TOE soldiers with whom we worked attributed heater malfunctions to a lack of spare parts (e.g., igniters). Another indicated that most soldiers are reluctant to report heater malfunctions because this report can cause their vehicle to be "deadlined." Instructors felt that most heater maintenance problems could be eliminated if soldiers were better trained in its operation in the first place.

**Squad leader issues.** All five of the squad leader issues regarded as serious problems by instructors also were regarded as serious problems by squad leaders. In total, squad leaders rated eight squad leader issues as serious problems.

Issues noted as serious problems all related to the squad leader's inability to see outside the vehicle except through the squad leader's periscope (SLP) and, then, only during the day in clear weather when dust, smoke, or haze are not present. The squad leader's periscope has no thermal viewing capability. This places the squad leader in an untenable position to navigate or control the ITV from his seat. Since it is equally impossible to navigate or control from the loader's hatch, the only reasonable alternative for the squad leader is to switch places with the gunner and operate from his station.

**Gunner issues.** Only two gunner issues were rated as serious problems by gunners. These were "eye strain from using a single eyepiece" and "exposure while firing the machine gun." As suggested earlier, this latter problem is partly because of the poor design of the gunner's seat. Instructors did not rate any gunner issues as serious problems.

In preparing the rating forms, two issues were included which were regarded as potential significant gunner problems. These were "operating trigger switches with thumbs vs. index fingers" and "operating slew switches with index fingers instead of thumbs." The design of the trigger switches and slew switches on the ITV is counterintuitive and is reversed from that on the Bradley fighting vehicle (BFV). On the BFV, trigger switches are operated by the trigger fingers, and slew switches are operated by the thumbs. Contrary to expectations, neither issue was rated as a problem. Nevertheless, the likelihood of an inadvertent wrong response at a critical moment is high on the ITV (pressing the slew switch when intending to press the trigger) and may be disastrous if it occurs.



**Driver issues.** One driver issue was rated as serious by drivers. This was "seeing through the driver's periscopes at night when buttoned up." This issue also was rated as serious by instructors. Additionally, instructors rated three other driver issues as "serious." These were:

- seeing through the driver's periscopes when they are in the sun's glare,
- seeing behind the vehicle, and
- driving with the launcher erect.

The driver's periscopes (also known as M17 periscopes) enable the driver to operate the vehicle with the hatch closed. There are four of them, and they are located to the front around the base of the hatch cover. The driver's periscopes depend on light being reflected through thick layers of glass. Consequently, they are difficult to use for driving under the best of conditions. At night or in the sun's glare, visibility drops to near zero.

Seeing behind the vehicle also is a problem for the driver. This is because his vision largely is blocked by the turret assembly and raised driver's hatch cover. Backing the ITV depends on the use of a ground guide located outside the vehicle. USASC (1988) contained several incidents where accidents resulted when a driver attempted to back the ITV without a ground guide.

Problems associated with driving with the launcher erect are significant. According to the Operator's Manual For Combat Vehicle, Anti-tank, Improved TOW Vehicle, M901 (Department of the Army, 1979, p. 2-201), "the maximum speed of the vehicle with launcher erected is only 5 mph." This puts an ITV crew at a tremendous disadvantage. It is virtually immobile while the launcher is erect.

**Loader issues.** No loader issues were rated as serious problems by loaders, and only one loader issue was rated as serious by instructors. This was "danger loading/unloading ATWESS cartridges." ATWESS (Antitank Weapon Effects Simulator System) cartridges are used in simulated force-on-force training exercises to imitate the sound of a TOW missile launch. This issue was included after reviewing the ITV accident reports (USASC, 1988). These reports included nine separate accounts between 1982 and 1988 where soldiers had been injured by ATWESS misfires. That this particular issue was singled out as a serious loader problem is significant in that it lends strength to the notion that accident reports can and should be used in the preparation of safety rating issues. The fact that this issue did not surface in any of the early test reports further attests to the value of analyzing these reports.

## Desired Features

The desired features analysis provided insights about the ITV and ITV training not provided by the ECA or human factors engineering/system safety/health hazards assessment methodologies. Soldiers used the opportunity to indicate their opinions about the good aspects of the vehicle and training. In addition, they used it to further clarify their concerns about the system and to offer their ideas about how the system could be improved. The following is a summary of key inputs to the analysis by soldier population.

**TOE unit soldiers.** Four of the TOE unit soldiers indicated that they had difficulty responding to questions about the best features of the ITV not because they had trouble understanding the question but because they did not feel that the system had any notably good features. Other soldiers expressed appreciation for the defensive capabilities of the ITV, particularly the standoff capability of the TOW (n = 4).

Many soldiers had ideas for improving the system. There was a great deal of commonality of ideas, even though soldiers completed this analysis independently. These ideas included designing the system so that:

- it has the speed and maneuverability to keep up with the M1 Abrams tank and M2 BFV (n = 4);
- the launcher can be erected, loaded, and stowed much faster than currently is possible (n = 3);
- it uses fire-and-forget missiles instead of wire-guided missiles (n = 3);
- the turret has a coaxial machine gun, not a machine gun that has to be stowed for turret operations (n = 3);
- it is as effective in the offense as it is in the defense (n = 2);
- the turret carries more than one dual launcher (e.g., two M2 BFV TOW launchers) (n = 2);
- the sighting system provides for better target acquisition at distant ranges (n = 2);
- the vehicle provides better armor protection (n = 1);
- the vehicle offers improved visibility (n = 1).

Comments were mixed about ITV training. The most noteworthy comments came from a squad leader and a driver. The squad leader

expressed a need for ITV crewmen to have some form of simulator training available to them like M1 Abrams tank and M2 BFV soldiers. The driver expressed the need for a simple procedural guide to aid in performing all types of tasks.

**Instructors.** Instructors' comments were largely consistent with those made by the TOE unit soldiers. They emphasized that the ITV is good in defense but is very vulnerable when it has to move. Factors seen as contributing to this vulnerability include the following:

- the lack of speed and maneuverability of the vehicle (especially when the launcher is erect) (n = 4);
- the length of time required to erect, load, and stow the launcher (n = 3);
- the restricted field of view from squad leader and gunner positions (n = 3);
- the inability to use the M60 machine gun when the turret is in operation (n = 1).

A number of concerns also were expressed related to the maintenance of the ITV. These concerns related most directly to the intercommunications system (n = 3), turret (n = 2), and heater (n = 1).

One instructor who had been seriously injured on the vehicle by a falling driver's hatch cover recommended that hatch covers on the next vehicle slide horizontally on rails instead of popping up and down.

**OSUT soldiers.** Input from most OSUT soldiers was of limited value because of their lack of experience on the system. Virtually all of their comments were very general and positive in nature. Perhaps most noteworthy was a comment regarding the need for the ITV squad leader and gunner to carry pistols. This was seen as a valuable comment because these soldiers' personal weapons must be stowed away from their crew positions. An emergency evacuation of the ITV leaves these soldiers defenseless.

It also is valuable to note that 11 of the 14 OSUT soldiers who commented on the ITV training were very positive about it. The concerns of the other three soldiers related to the need for additional time for practice and the need for some hands-on experience with the ITV.

## Other Feedback

Accidental injuries in or around the vehicle. TOE unit soldiers were asked if they had experienced any accidental injuries in or around the ITV. Eighty-one percent ( $n = 13$ ) of the soldiers reported injuries, ranging from cuts and bruises to broken bones and back and head injuries. Injuries were attributed to the following factors:

- general lack of space and padding ( $n = 6$ );
- sharp edges climbing into and out of seats ( $n = 4$ );
- inadequate in-vehicle storage restraints on TOW traversing mechanism and tripod ( $n = 2$ );
- falling hatch covers ( $n = 2$ );
- lack of visibility when driving using black out lights ( $n = 1$ );
- poor design of gunner's seat for observation during travel ( $n = 1$ );
- lack of back support on driver's seat ( $n = 1$ );
- lack of tools and equipment for certain repairs (i.e., changing road wheels) ( $n = 1$ ).

Accidental damage to equipment. TOE unit soldiers also were asked if they had accidentally damaged any equipment on the ITV. The majority of the reported incidents were associated with the sights and sight (J1) cable connector pins. Most dramatic were two unrelated incidents where a sight was dropped from the top of a vehicle to the ground. One sight was dropped while "rushing during a crew drill." The other sight was dropped while the soldier was trying to get on top of the vehicle.

Problems related to dropping sights from the top of the vehicle have been reported elsewhere. As an illustration, Hammond and Redden (1984) noted:

Most of the sample battalions had already eliminated the timing of crew drills as they were experiencing a lot of damaged equipment when troopers got in such a hurry that they were more likely to drop sights, bend cable pins or wires, etc. (pp. 6-7).

In total, eight of the 16 TOE unit soldiers reported having concerns about the fragility of the sights and five reported having accidents involving them. This is a significant problem, given that the loss of the daysight tracker or night sight would have a totally disabling effect on the vehicle as an anti-armor weapon system.

Other reports of accidental damage were noted in regard to hydraulic lines. Hydraulic lines in the turret also frequently were reported as leaking. These results are consistent with those obtained by Hammond and Redden (1984). In that study, the sights, missile guidance set connections, and hydraulics were singled out for their fragility.

## **Discussion**

### **Summary**

The current research was performed for two reasons. One reason was to account for the discrepancy between the USAIS (1987) ECA and other source data (e.g., Hammond & Redden, 1984; Smith, Thompson, & Nicolini, 1980). The other reason was to try to determine ways of enhancing the information derived from recommended ECA data sources (i.e., USASSC-NCR, 1987).

A broad approach was taken toward this research. The intent was to look for insights to issues which appeared worthy of raising. The research was designed:

- to assess the utility of having rating materials that include task descriptions;
- to address crew-level collective tasks;
- to facilitate consideration for the conditions under which operator tasks may be performed;
- to gain a better understanding of the value of using SMEs with different types and amounts of experience;
- to limit guessing;
- to assess the value of a forced-choice method in providing for the early verification of high driver tasks;
- to outline an approach for treating human factors engineering, system safety, and health hazard issues;
- to collect information on the desired features of the system.

As part of this effort, an ECA was performed using 61 M901/M901A1 ITV operator tasks. Ratings were accomplished by three different soldier populations (TOE unit soldiers, instructors, and OSUT soldiers). In total, nine tasks were identified as high drivers.

The research provided a basis for explaining the discrepancy between the results of the USAIS (1987) ECA and other source data. It served to identify significant problems of the ITV, providing a basis for improving future infantry systems. The research also suggested several means for enhancing the information developed using recommended ECA data sources, particularly information obtained from SMEs. These results are discussed in the following paragraphs.

### **Research Issues**

**Task descriptions.** As predicted, soldiers who received rating materials that included task descriptions generally showed less variability in their ratings than soldiers who received rating materials that did not include these descriptions. Steps aimed at limiting unwanted variability in the ECA rating process must be regarded as beneficial to the overall quality of the analysis. However, a decision in favor of incorporating the use of task descriptions in the ECA does not appear warranted.

Unexpectedly, soldiers provided task descriptions also showed lower mean ECA task ratings than soldiers not provided these descriptions. As a result, soldiers in the former groups tended to rate fewer tasks as high drivers than soldiers in the latter groups. There was no apparent effect of task descriptions on which tasks were identified as high drivers. Tasks rated as high drivers by soldiers in the former groups were included in those rated as high drivers by soldiers in the latter groups.

Why did the task descriptions act to reduce soldiers' overall ECA task ratings? Perhaps the most reasonable explanation is that soldiers without task descriptions believed that tasks to be rated included more or more difficult steps than they actually did. In other words, they saw tasks as overlapping more than they actually do.

Given these results, the best approach appears to be to continue using task titles without descriptions. Task descriptions take time to develop, and they lead soldiers to rate fewer tasks as high drivers. If an error is made, it would be safer to induce soldiers to err in the direction of rating too many tasks as high drivers. There is far less risk associated with treating a task as a high driver when it is not a problem task, than not treating a task as a high driver when it is a problem task.

**Use of organized task lists.** In the current research, task lists were organized by duty position (squad leader, gunner, driver, and loader) and vehicle subsystem (automotive, turret, weapons, communications). The use of organized task lists for ECAs is not new. For example, organized task lists were used in

conducting the lighter air cushion vehicle - 30-ton (LACV-30) ECA (Klaas, Walker, Tuttle, & Garzone, 1989). The use of organized task lists was not treated as an independent variable. However, the approach is seen as holding a number of potential benefits. These benefits include reducing the processing demands associated with rating a large number of tasks, facilitating systematic consideration of all tasks, and assisting ECA developers by highlighting gaps and overlaps in task lists.

**Crew-level collective tasks.** Crew-level collective tasks involving the ITV were analyzed in this research. Primary interests were in determining whether raters would have any special difficulties rating the tasks, and whether they would regard a disproportionately high number of them as high drivers. No evidence was found to suggest that raters had any particular difficulties rating the crew-level collective tasks. No crew-level collective task presented to the raters was rated as a high driver.

However, two individual, supervisory tasks which were apparently interpreted as collective tasks were rated as high drivers. These tasks were "Conduct Mounting of an M220 Launcher System on an M901 Vehicle" and "Conduct Dismounting of an M220 Launcher System from an M901 Vehicle." Soldiers primary concerns with these tasks did not involve their individual, supervisory aspects, but centered instead around their physically demanding collective aspects. Further, three of the five crew tasks achieved a rating of 2.5 or higher on the ECA "Task Performance Difficulty" scale (USASSC, 1987). This scale is one of the four ECA scales most closely associated with task difficulty (Task Performance Difficulty, Task Learning Difficulty, Time to Train, and Decay Rate).

Overall, there is good reason to treat crew-level collective tasks in some type of front-end analysis. This analysis need not be ECA, although it appears possible to use ECA. Not all collective tasks can be sensibly rated. Then too, not all collective tasks should be rated. They do not involve meaningful interactions of soldiers with specific systems. The point is to assure that all crew-level collective tasks are not systematically disregarded in analyses for new weapon systems simply because they are collective tasks.

**Operator tasks.** This research was designed to facilitate consideration for the various conditions under which operator tasks must be performed. Conditions such as inclement weather, limited visibility, fatigue, stress, and so on all can affect perceptions about a task's performance difficulty. It is not clear from the current research if this method of heightening soldiers' awareness of task performance conditions had any appreciable effect. We performed no independent test of this hypothesis. However, the impact of task performance conditions

on "Task Performance Difficulty" is worth raising and deserves consideration as a subject of future research.

**Rating sample.** Clear evidence was obtained supporting the use of raters with many years of relevant experience with a system. Roughly speaking, 5 to 7 years of relevant experience appears about the minimum required for raters either to appreciate the seriousness of problems or to report problems as serious problems. Further, this result appears true regardless if tasks or human factors engineering, system safety, and health hazards issues are being rated.

In developing a rating sample, it would appear best to draw on instructors and soldiers in units with many years of relevant experience. To conserve resources and minimize the amount of unknowledgeable input, these individuals should be selected before anyone is asked to perform task ratings. Having larger numbers of raters is important. It gives depth to the sample. However, the results indicate that having larger numbers of raters is not as important as having a sufficient number of highly experienced raters.

In terms of types of problems reported, our research indicates a bias of TOE unit soldiers to highlight concerns related to "Task Performance Difficulty" and "Decay Rate" and a bias of instructors to highlight concerns related to "Task Learning Difficulty" and "Time to Train." These are reasonable biases given these individuals' unique job responsibilities and the nature of the difficulties they are likely to encounter in responding to them.

**Limiting guessing.** Types and amounts of expertise varies greatly among noncommissioned officers. Not all are equally knowledgeable. Not all have performed all tasks or necessarily remember much about the tasks. Few will have ever performed the tasks under combat or even less than optimal conditions. Keeping this in mind, it is important to obtain input from a wide sample of knowledgeable individuals and to avoid diluting this input in any way.

Unknowledgeable input or guesses may come from generally knowledgeable SMEs as well as from nonexperts. For example, SMEs may lack experience performing specific tasks or may have forgotten how to perform specific tasks. A key reason for using the "5 = NO OPINION...DON'T KNOW" response alternative was to try to avoid problems that result from guessing.

An alternative approach to avoiding these problems is to instruct raters to rate tasks only for which they have personal, hands-on experience. The main disadvantage of this approach is that all tasks will not be rated by all raters. Data will be missing on some tasks, and missing data are impossible to interpret. There is no way to tell if the rater is unfamiliar



with the task or simply failed to rate the task. Using the "5 = NO OPINION...DON'T KNOW" response alternative carries the added advantage of providing for the identification of tasks which are unfamiliar or infrequently performed.

**Early verification of high driver tasks.** The forced-choice approach may hold some potential as a means of providing for the early verification of ECA results, but this potential was not realized in this research. For example, there were no instances in which a task rated as a high driver also was rated by half the relevant rating population as a problem task.

It is not clear why the forced-choice approach was not effective. However, the outcome of this research could have been influenced by the decision to include the following direction:

If you feel it is a problem task, briefly explain why in the space provided.

This direction effectively "punished" raters for checking, "This task is a problem task." It required that they spend extra time developing an explanation and writing that explanation in their rating booklet. There was no related requirement for checking, "This task is not a problem task."

A better approach would have been to have talked to soldiers about why they rated specific tasks as problem tasks after they had completed their ratings. At least this approach would have provided for a fairer test of the forced-choice approach. A third, "NO OPINION...DON'T KNOW," response alternative also should have been provided to help limit guessing. The forced-choice approach is subject to the same concerns related to guessing as the use of multiple rating scales.

**Human factors engineering, system safety, and health hazards issues.** As indicated earlier, no current analysis of to-be-replaced systems, that is not both technically oriented and labor intensive, is known to provide for the capture of critical human factors engineering, system safety, and health hazard issues. These data are developed for new systems but not for existing ones.

In conducting this research, a three-step approach was employed which can work for many existing systems. The approach entailed obtaining some firsthand experience with the system; obtaining copies of accident and test reports and analyzing them for critical human factors engineering, system safety, and health hazard issues; and obtaining feedback from current users and instructors as to the continuing relevance of the issues.

In reviewing the literature surrounding the testing of the ITV, a concerted effort was made to track human factors engineering, system safety, and health hazards issues to their

original sources (Appendix M). This tracking was accomplished, in part, because of the many USASC (1988) reports of accidents involving the operation of the ITV. Numerous accident reports appeared linked more or less directly to system design problems raised during operational testing. For example, the problem of latches working loose on hatch covers has been raised repeatedly in test documents since the late 1970s (e.g., Hammond & Redden, 1984; Robinson, McClure, & Mock, 1978; Smith, Thompson, & Nicolini, 1980). Additionally, over 30 formal accident reports involving collapsing hatch covers on the ITV were filed between 1982 and 1988. While it may have been too late during operational testing to fix the many design problems of the ITV, care must be taken to prevent these same problems from recurring in a future infantry system. Problems that are not prevented or fixed do not go away.

The example of the collapsing hatch covers was selected because it is highlighted in independent test reports, is linked to numerous accidents, and was reconfirmed as a problem for ITV crewmembers in the current research. More significantly, the problem does not relate specifically to any particular task. Consequently, it was not noted as a problem in the present ECA or in the ECA performed by USAIS (1987). The results of the current research demonstrate the value of collecting data on human factors engineering, system safety, and health hazards issues as well as data on tasks. Using both types of data, it was possible to provide a clearer picture of the problems affecting the ITV than either type of data could provide by itself.

ECA, coupled with a broad-based analysis of human factors engineering, system safety, and health hazards data, can lead to the capture of a wide range of important lessons learned. These lessons learned, which normally are compiled over the lifetime of to-be-replaced systems, should go a long way toward improving system developers' awareness for issues likely to impact on the design of follow-on systems.

**Desired features analysis.** ECA focuses on identifying high driver tasks and assuring that those tasks do not remain high drivers on a follow-on system. It is a "problem-oriented" analysis. This does not detract from the ECA. "Problem-oriented" analyses play a very important role in the system development process. However, "opportunity-oriented" analyses also are needed. These analyses are driven less by requirements and problems than by possibilities.

Desired Features Analysis is intended as an "opportunity-oriented" analysis. This analysis would provide three types of data that currently are not being collected in any systematic way on predecessor systems:

1. information about the best or most desirable design features of the predecessor system;

2. information about the best or most desirable design features of systems related to the predecessor system;
3. ideas for improving the design of the follow-on system.

The analysis also would identify any especially noteworthy nonsystem (e.g., training) approaches used in support of the predecessor system. The intent, of course, is not to prevent the transfer of bad ideas (and MANPRINT costs) from system to system, but to facilitate the transfer of good ideas (and MANPRINT savings) from system to system.

Part of this research entailed collecting data on the best features of the ITV and ITV training. Soldiers also were asked about their ideas for improving the design of a follow-on system. Soldiers were not specifically asked for input on the best or most desirable design features of related systems, but many suggestions were offered that referenced features on other vehicles (e.g., BFV). Based on the quality of the input received, the approach appears to have merit.

As an example, one suggestion related to the hatch cover problem cited earlier. The soldier recommended that, in the follow-on system to the ITV, the "pop up" design of the driver and gunner hatch covers be changed to one where these hatch covers slide horizontally on rails. This design change not only would keep hatch covers from falling on soldiers, but also would free soldiers from having to fasten them back with straps during travel, and would allow the driver a much better view to the rear of the vehicle. It is worth noting that a similar suggestion for improving hatch cover designs was offered by Smith, Thompson, and Nicolini (1980, p. 47).

### **Issues for Further Research**

**Developing crew-level collective task ratings.** The best means for developing crew-level collective task ratings remains open to investigation. In the current research, all crew level collective tasks were rated by individuals occupying the squad leader position. One advantage of this approach is its simplicity. However, the approach may suffer from problems associated with having a single individual attempt to rate tasks that are performed by at least two individuals.

An alternative approach is to obtain ratings from individual crew members. An advantage of this approach is that each participating crew member has the opportunity to influence the rating process. However, there are at least two potential disadvantages. Ratings based on group consensus take more time to develop than ones generated by individuals working alone. Also, ratings based on group consensus are not necessarily any

more accurate than individual ratings, particularly if one individual within the group controls the rating process.

**Using "total system SMEs".** Years of relevant experience had a potent impact on the quality of rating data that were obtained in this research. By implication, there may be considerable value in emphasizing the use of "total system SMEs" in future ECAs.

Very few individuals have the types and amounts of system-specific subject matter expertise to be regarded as total system SMEs. Just because an individual has had experience using a particular system does not necessarily qualify him (or her) in such a role. Typically, total system SMEs not only have spent time using a particular system, they have spent time studying it and looking for ways to improve it or its use. Usually they have a good historical perspective on issues and concerns surrounding a system and what has been tried in addressing these issues and concerns.

It is not unusual to find only one or two total system SMEs associated with any given system. Nevertheless, taking the time to locate them and gather their input may provide a number of key advantages. Collected early, these inputs may be useful in guiding the definition and organization of tasks. Collected later, these inputs may help establish a baseline against which other inputs can be judged for reasonableness.

Sampling the opinions of total system SMEs also may help to identify tasks that are not particularly resource intensive but which could be eliminated or accomplished more easily by a simple design change. These tasks impose unnecessary demands on resources but may come to be readily accepted by users as a natural part of system operation, maintenance, or repair.

**Value of the forced-choice approach.** The forced-choice approach may hold potential as a means of providing for the early verification of ECA results. The approach also may hold potential as a means of establishing tasks as "problem tasks." Unfortunately, the present research failed to demonstrate the value of this approach for either purpose.

As suggested earlier, the failure to demonstrate the utility of the forced-choice approach for the early verification of ECA results appears tied to the use of a written direction that penalized raters for marking tasks as "problem tasks." Similarly, the failure to demonstrate the utility of the forced-choice approach as a means of establishing tasks as "problem tasks" appears linked with the use of OSUT soldiers as raters. Both of these notions are testable and deserve consideration in future research.

## High Drivers Revisited

Why were the tasks rated as high drivers rated as they were? A number of reasons already have been cited. These reasons include crew shortages and turbulence and possible deficiencies in training. But there also are many problems for which MPT solutions do not appear adequate or appropriate.

Input received from instructors during the ECA validation process points toward system design problems as underlying or contributing to the selection of eight out of nine of the tasks as high drivers. The ninth task, "Maintain the Engine on an M113-series Vehicle," was not regarded in follow-up interviews as warranting classification as a high driver.

Concerns associated with mounting and dismounting the M220 launcher system centered around a combination of factors, to include the weight of the equipment, the fragility of the equipment, the speed with which the many steps encompassed by the task must be performed, and the confined space in which the crew has to operate. Concerns associated with maintaining the personnel heater include lack of spare parts (e.g., igniters), detailed manuals, and authorization for maintenance. There also was some reluctance by crews to report heater malfunctions, assuming that these reports may lead to the deadlining of their vehicle. As suggested in Appendix K, many of these concerns could be alleviated by improved training on heater start up and shut down procedures.

Similar system related issues were raised with respect to maintaining the hydraulic system, maintaining the turret, and maintaining the track and suspension system. The turret hydraulics on the ITV were regarded as being very fragile and constantly in need of maintenance. Breaking the track to replace worn track shoes was viewed as being highly physically demanding.

Operating the turret was seen as being complicated by large numbers of disconnected procedures. As a result, this task was viewed as being especially difficult to learn, retain, and perform.

Driving the ITV was regarded as posing problems for a host of reasons. Key reasons include the vehicle's lack of speed, power, and maneuverability. The lack of back support on the driver's seat also was frequently cited as a problem. Drivers reported developing lower back pains from driving the vehicle over even short distances. Additionally, driving the vehicle at night under blackout light conditions or using the driver infrared periscope (M19) were routinely noted as causing focus and depth-perception problems.

## **Conclusions: Some Implications for Follow-on System Designs**

This research carries specific implications for the design of future combat vehicles and future infantry training. Some of the more noteworthy implications are highlighted in the following paragraphs.

**Increased padding for improved safety and comfort.** A large proportion of the human factors and safety problems that surfaced during this research could be overcome in follow-on systems if the amount of padding afforded crews was significantly increased. In addition to the added safety and comfort the padding would provide, it would also help moderate the effects of noise, vibration, and extreme temperatures.

**Improved seating for reduced muscle fatigue.** Three of the highest rated common crew issues (ranked 6, 7, and 8 overall) centered around issues associated with seating and riding discomfort in the ITV. It is especially important that seats in any future combat vehicle be designed with sufficient back support to prevent lower back fatigue. This would seem particularly true for drivers and loaders whose work tends to put extra stress on their lower back muscles.

**Enhanced visibility for improved performance.** The level of visibility afforded crews operating from an ITV is so limited that significant system capabilities are undermined. This is particularly true for the squad leader who cannot navigate or carry on all necessary control functions from his seat. Fully 88% of the human factors engineering, system safety, and health hazards issues rated as serious or moderate problems by squad leaders related to visibility. Visibility problems also were cited by both the driver and the loader. Sixty-seven percent of the human factors engineering, system safety, and health hazards issues rated as serious or moderate problems by drivers related to visibility, and loaders reported not being able to make observations from the cargo hatch. Systems built to operate in the battlefield of the future must be designed to enhance crew members' visibility under all conditions, not limit it.

**Improved system designs for reduced vulnerability.** Future combat vehicles must be designed to reduce the vulnerability of crews to all types of enemy fire, both from the ground and from the air. Critical here is the need to produce systems that do not cause unnecessary exposure of the crew when doing such things as firing the machine gun, boresighting and collimating, or simply observing from the gunner's hatch. Essential too is the need to allow observations to the rear of the vehicle, particularly if these observations are to be made from an open loader's hatch. Perhaps most important of all is the need to field systems that present poor targets for threat vehicles and dismounted infantry. Like the ITV, the system must be good in

defense. Unlike the ITV, the system must be quick and effective when it is forced to move.

**Streamlined turret procedures.** There are so many turret procedures in the ITV and they depend so heavily on learning and memory that they must be constantly refreshed to be sustained. This problem can be alleviated greatly in future systems by reducing the number of turret procedures that must be performed by the gunner and by improving the sequencing and organization of these procedures. This can be accomplished in large measure by designing operator panels so that turret procedures are predictable or cue one another in sequence.

**Better load planning training.** All of the raters, with the exception of the gunners, regarded the cramped, crowded nature of the ITV as a serious problem. There is no easy way to avoid this problem in future combat vehicles. However, a partial solution may lie in training (e.g., Mayville, 1987). Soldiers need to be trained to tailor their loads to mission requirements. They need to know how to assess risks associated with traveling with lighter loads instead of attempting to equip themselves for all possible contingencies. It is the leaders who should receive this training, since it is they who must assess the risks and decide what their soldiers will carry and what they will leave behind.

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## **APPENDIX A**

### **EARLY COMPARABILITY ANALYSIS (ECA) PROCEDURES**

Steps involved in performing an ECA are described in the following paragraphs. These steps were drawn from the U.S. Army Soldier Support Center - National Capital Region (USASSC-NCR) (1987). Examples cited also are based on information contained in this guide.

#### **Step 1: Initiate the Analysis**

The first step in the ECA is to determine if it is appropriate. Normally, this occurs during the development of the System MANPRINT Management Plan (SMMP). Generally speaking, an ECA is appropriate if:

- there is not a vast technological gap between the predecessor/reference system or component and the conceptual system or component;
- there is a clearly defined predecessor system in the Army inventory;
- the predecessor or reference system and the conceptual system are not too dissimilar;
- tasks will be performed by soldiers on the conceptual system;
- previous studies do not serve the purpose of the ECA;
- predecessor/reference tasks are not insignificant from an MPT perspective.

#### **Step 2: Identify Relevant MOS**

This step entails identifying the MOS of the soldiers that operate, maintain, and repair the predecessor and/or reference systems selected for study in Step 1.

#### **Step 3: Collect Task Lists**

This step involves collecting lists of critical and non-critical tasks performed by operators, maintainers, and repairers of the systems under study. A task is defined as the lowest level of behavior in a job that describes the performance of a meaningful function in the job under consideration.

#### **Step 4: Develop Task Rating Data**

Tasks are rated using input from SMEs and pertinent source materials. Each task is rated on the basis of six criteria. The

criteria and associated four-point rating scales are as shown in Table A-1.

#### **Step 5: Assign Values for Task Criteria**

This step entails the manipulation of data collected from various source materials to fit the four-point ECA scales, computing average ratings for SMEs for each criterion and task, and combining the source material and SME rating data.

USASSC-NCR (1987) provides several examples of how information from various sources, such as TRADOC service school surveys, research reports and Army studies, can be converted to the four-point ECA scale format. One example describes the process of converting scores obtained using a seven-point scale to the four-point ECA scale. A different example describes how to develop a scale value based on qualitative, non-scaled input.

Once the data from available sources are developed, separate ECA task scores are computed by averaging across sources. Data from each source is weighted equally. An example appears in Table A-2.

As shown in Table A-2, five SMEs rated Task 1 using the six criteria shown in Table A-1. An earlier service school survey reported that Task 1 is moderately difficult to learn. Also a previously published Army Research Institute (ARI) report revealed that Task 1 is not difficult to perform. Averaging the SME ratings and combining the results for task learning difficulty and task performance difficulty, weighted equally across sources, yields the data to be used in determining the ECA task score.

#### **Step 6: Calculate the ECA Task Score**

The ECA task score is computed by multiplying the six, final criterion values for each task. Percent performing is eliminated if data are not available. For example, the ECA task score for Task 1 (Table A-2) would be computed as shown in Table A-2.

#### **Step 7: Identify "High Drivers"**

Tasks that score 216 or higher (six criterion values) or 90 or higher (five criterion values) are regarded initially as high drivers. (The task shown in Table A-2 would not be regarded initially as a high driver.) Once the task scores have been computed, they should be verified by SMEs. If discrepancies exist between the task scores and SME input based on this review, the combat developer is responsible for determining if a task is or is not a valid high driver. Reasons behind any changes also must be documented.

**Table A-1**

**ECA Task Rating System**

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<b>Percent Performing (PP):</b>	What proportion of the relevant MOS and skill level performs this task?  1 = 1 - 25% 2 = 26 - 50% 3 = 51 - 75% 4 = 76 - 100%
<b>Task Learning Difficulty (TLD):</b>	How difficult is it for the average soldier, in the appropriate MOS and the appropriate skill level, to learn this task?  1 = Not difficult 2 = Somewhat difficult 3 = Moderately difficult 4 = Very difficult
<b>Task Performance Difficulty (TPD):</b>	How difficult is it, for the average soldier, of the proper skill level and in the proper MOS, to perform this task? Consider both cognitive and physical difficulty.  1 = Not difficult 2 = Somewhat difficult 3 = Moderately difficult 4 = Very difficult
<b>Frequency Rate (FR):</b>	On the average, how often is this task performed by the average soldier of the proper skill level and in the proper MOS?  1 = Seldom (Annually) 2 = Occasionally (Semi-annually/quarterly) 3 = Often (Monthly) 4 = Frequently (Daily/Weekly)
<b>Decay Rate (DR):</b>	Given this task, how much proficiency is lost by the average soldier from the end of his formal training until he is first performs the task in the field? (Assume that the task is performed within a reasonable period of time after training and is performed by an average soldier of the proper skill level and in the proper MOS.)  1 = Low 2 = Moderately low 3 = Moderately high 4 = High
<b>Time to Train (TT):</b>	How much time is required to train the average soldier, of the proper skill level and in the proper MOS, to perform this task to standard?  1 = Less than 3 hours 2 = 3 hours or more but less than 6 hours 3 = 6 hours or more but less than 9 hours 4 = 9 hours or more

**Table A-2**

**Computing ECA Task Scores**

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<b>Task 1</b>	<b><u>PP</u></b>	<b><u>TLD</u></b>	<b><u>TPD</u></b>	<b><u>FR</u></b>	<b><u>DR</u></b>	<b><u>TT</u></b>
SME 1:	4	1	1	3	1	2
SME 2:	3	1	1	3	1	3
SME 3:	3	2	2	4	2	2
SME 4:	3	2	1	4	4	1
SME 5:	2	1	2	3	3	3
Mean (SME):	3.0	1.4	1.4	3.4	2.0	2.2
School Survey:		3				
ARI Report:			1			
Grand Mean:	3.0	2.2	1.2	3.4	2.0	2.2
ECA Task Score:	3.0 x	2.2 x	1.2 x	3.4 x	2.0 x	2.2 = 118.50

#### **Step 8: Conduct Task Analysis**

The purpose of the task analysis is to break each high driver task into its individual steps, identify the tools and test equipment required to perform the task, identify the conditions under which the task must be performed, and identify the standards to which the task must be performed.

#### **Step 9: Conduct Learning Analysis**

This step involves identifying the knowledge, skills, and abilities (KSAs) a soldier must possess to perform each high driver task to the stated standard under the stated conditions.

#### **Step 10: Identify Deficiencies**

This step involves comparing the KSAs required by the MOS with the KSAs required to perform the high driver tasks. The purpose of this comparison is to identify MPT deficiencies. For example, the learning analysis may indicate that the task requires a basic knowledge of algebra. If algebra is not a prerequisite for entry into the MOS and it is not being taught by the institution, then a deficiency exists.

#### **Step 11: Determine Solutions**

Once deficiencies have been identified, alternative MPT solutions are explored. If a reasonable MPT solution exists, then a materiel change is not necessary. If there is no reasonable MPT solution, a materiel solution is required.

#### **Step 12: Prepare Report**

Once all of the preceding steps have been completed, the proponent service school is responsible for documenting and disseminating the results.

APPENDIX B

M901/M901A1 ITV OPERATOR TASKS

Decontaminate Equipment Using NBC M11 Decontaminating  
Apparatus

Task Number: 031-503-1022

Category: Automotive

Duty Position(s): SL, D

Occupation/Skill Level: 11H-1

Description:

Involves cleaning vehicle and individual components to remove contaminants. Cleaning must be done in accordance with specified procedures and safeguards.

**Perform Emergency Evacuation from the ITV**

Task Number: 13 Student Study Guide (M901A1)

Category: Automotive

Duty Position(s): SL, G, D, L

Occupation/Skill Level: 11H-1

Description:

Involves emergency escape procedure from combat-loaded ITV.



Supervise Towing of a Vehicle

Task Number: 071-200-0001

Category: Automotive

Duty Position(s): SL, D

Occupation/Skill Level: 11H-2

Description:

Involves determining the method by which the disabled vehicle will be towed and the equipment required and supervising the connection and towing of the disabled vehicle. Includes the application of maximum safety throughout performance of task and knowledge of the procedures used.

Charge a Battery Using a PP-7382/TAS Battery Charger

Task Number: 071-316-2538

Category: Automotive

Duty Position(s): SL

Occupation/Skill Level: 11H-3

Description:

Involves removing battery cover; switching power OFF; removing power cable from battery cover and connecting with J7 input power connector; connecting other end of power cable to power source; switching power ON; checking to ensure that input power indicator light illuminates; releasing latch and opening one or both battery covers; inserting one to six nickel cadmium batteries into battery charger; securing battery covers; setting timer reset switches; and charging until indicator light goes out.

**Destroy Supplies and Equipment**

Task Number: 071-600-0001

Category: Automotive

Duty Position(s): SL, G, D, L

Occupation/Skill Level: 11H-1

Description:

Involves emergency destruction with explosives, fire, or similar method to prevent enemy capture and use of supplies and equipment.

Supervise Zeroing of Organic Weapons

Task Number: 071-000-0002

Category: Weapons

Duty Position(s): SL

Occupation/Skill Level: 11H-2

Description:

Includes identifying weapons requiring zeroing, identifying firing area, supervising correct zeroing procedures, and ensuring use of safety procedures.

Fire an M243 or M259 Smoke Grenade Launcher

Task Number: 071-034-0004

Category: Weapons

Duty Position(s): SL, G

Occupation/Skill Level: 11H-1

Description:

Involves directing the driver to position front of vehicle directly at area where smoke is desired, placing SMOKE LAUNCHER ARM/OFF switch to ARM, and pressing FIRE to release eight grenades.

Conduct Mounting of an M220 Launcher System  
on an M901 Vehicle

Task Number: 071-056-0041

Category: Weapons

Duty Position(s): SL

Occupation/Skill Level: 11H-2

Description:

Involves giving command to mount the launcher system, supervising to assure that safety precautions are complied with; missile guidance set (MGS) is secured in vehicle with vehicle power conditioner (VPC) installed; coil cable connected to MGS; power conditioner cable is connected to VPC; optical sight and night sight properly installed; traversing unit, launch tube, tripod, collimator, encased missiles, etc., are properly stowed; and self-test portion of the system checkout procedure is completed and the launcher system is operational.

Conduct Dismounting of an M220 Launcher System  
from an M901 Vehicle

Task Number: 071-056-0045

Category: Weapons

Duty Position(s): SL

Occupation/Skill Level: 11H-2

Description:

Involves giving command to dismount the launcher system, supervising to assure that safety precautions are complied with; vehicle is in a covered and concealed position with ramp lowered and engine off; missile guidance set (MGS) is removed from its mounting bracket and a battery assembly is installed; nightsight and optical sight are removed from launcher assembly; launch tube, traversing unit, tripod, collimator, encased missiles, etc. are removed from vehicle stowage areas; nightsight is placed in its carrying case; MGS cover is placed on the MGS and secured; and equipment is in position for movement to a ground firing site.

Conduct Placement of a Dismounted M220 Launcher  
System into Action

Task Number: 071-056-0060

Category: Weapons

Duty Position(s): SL, G, D, L

Occupation/Skill Level: 11H-2

Description:

Involves assigning squad members specific equipment to transport to the firing site; instructing squad members on their specific duties at the firing site; directing squad movement to the firing site; conducting the actions required of the squad to place the TOW in a ground mount mode.



Operate the Squad Leader's Periscope on an M901 Vehicle

Task Number: 071-316-2537

Category: Weapons

Duty Position(s): SL

Occupation/Skill Level: 11H-2

Description:

Involves looking into the eyepiece of the periscope, focusing the periscope, conducting search and target acquisition procedures, and estimating distance and direction to a target or a specific point.

### Engage a Target

Task Number: Battle Drill 4

Category: Weapons

Duty Position(s): SL, G, D, L

Occupation/Skill Level: 11H-1

Description:

Involves the crew moving to TOW firing position and squad leader giving commands; gunner attempting to acquire and identify the target and determining if it can be engaged; loader checking backblast area and standing ready to load another missile, and driver moving vehicle at command from squad leader.

Reload TOW Launcher (ITV)

Task Number: Battle Drill 6

Category: Weapons

Duty Position(s): G, L, SL

Occupation/Skill Level: 11H-1

Description:

Involves gunner and loader reloading the TOW launcher after both missiles have been fired.

Perform Misfire/Hangfire Procedures (ITV)

Task Number: Battle Drill 8

Category: Weapons

Duty Position(s): G, L, SL, D

Occupation/Skill Level: 11H-1

Description:

Involves crew responding to failure of dual launcher to fire one or both missiles.

Perform Emergency Action Procedures (ITV)

Task Number: Battle Drill 9

Category: Weapons

Duty Position(s): G, L, SL, D

Occupation/Skill Level: 11H-1

Description:

Involves crew attempting to erect/operate/reload/stow TOW launcher manually as a result of an electrical power failure.

Operate Intercommunications Set AN/VIC-1  
on a Tracked Vehicle

Task Number: 113-- (ref: CMF 11 Task List)

Category: Communications

Duty Position(s): SL, D, G, L

Occupation/Skill Level: 11H-1

Description:

Involves turning MAIN PWR switch to INT ONLY, POWER CKT BKR to ON, connecting CVC helmet leads to intercom control. MONITOR switch is turned to INT ONLY.

Send a Radio Message

Task Number: 113-571-1016

Category: Communications

Duty Position(s): SL

Occupation/Skill Level: 11H-1

Description:

Involves sending a radio message using correct radio procedures, correct prowords, and correct phonetic alphabet and numbers.

**Prepare Radio Set AN/VRC-64 or AN/GRC-160 for Operation**

Task Number: 113-587-1062

Category: Communications

Duty Position(s): SL

Occupation/Skill Level: 11H-1

Description:

Includes installing the radio set in the vehicle, attaching antennas, and completing serviceability checks.



Prepare Radio Set AN/PRC-77 or AN/PRC-25 for Operation

Task Number: 113-587-1063

Category: Communications

Duty Position(s): SL

Occupation/Skill Level: 11H-1

Description:

Involves preparation for use, to include removing and replacing batteries. This task also may include dismounting the radio from the vehicle and attaching a man-carry harness.

Operate Radio Set AN/VRC-64 or AN/GRC-160

Task Number: 113-587-2002

Category: Communications

Duty Position(s): SL

Occupation/Skill Level: 11H-1

Description:

Includes turning radio on/off; setting frequencies;  
adjusting volume; attaching security devices as required;  
and communicating with other stations.

Perform Operator's PMCS on AN/VRC-12 Series Radio

Task Number: 113-587-3077

Category: Communications

Duty Position(s): SL

Occupation/Skill Level: 11H-1

Description:

Includes inspection and correction of faults in communications system in vehicle, applying safety procedures regarding use and ability to operate system.

Maintain the Turret on an M901 Vehicle

Task Number: 071-214-0001

Category: Turret

Duty Position(s): G

Occupation/Skill Level: 11H-1

Description:

Involves conducting an operational checkout of the turret and fire control equipment and corrections within operator capabilities. Also includes cleaning and lubricating of the turret following scheduled maintenance procedures and recording and reporting any uncorrected shortcomings.

Operate the Turret on an M901 Vehicle

Task Number: 071-214-0002

Category: Turret

Duty Position(s): G, L

Occupation/Skill Level: 11H-1

Description:

Involves ensuring that the top deck is clear of personnel and loose objects, M60 machine gun is in the stow position, and gunner's hatch is closed; checking the gunner's control panel to ensure that the switches are properly set; checking with the driver to ensure that engine idle speed is at 1,200 to 1,500 rpms; applying turret power; manipulating switches and interpreting indicators on gunner's control panel to test and adjust lights, erect, load, and stow the launcher and to select, arm and/or safe missiles in the launcher as required by mission; using gunner's hand control assembly to select desired optics, to track targets, to fire selected missile, and to identify trigger switch failure; and stowing the launcher when use of the turret is no longer required.

**Mount an M60 Machine Gun on a Vehicle**

Task Number: 071-020-0003

Category: Weapons

Duty Position(s): G

Occupation/Skill Level: 11H-1

Description:

Involves placing the M142 gun mount pintle into the socket of the pintle mount on the vehicle; tightening the pintle mount locking handle; rotating the pintle to ensure that it rotates freely; locking the gun platform in the horizontal position; placing the M60 on the gun platform; and lowering the butt of the M60 so that the rear mounting pin engages the gun platform latch.

Dismount an M60 Machine gun from a Vehicle

Task Number: 071-020-0004

Category: Weapons

Duty Position(s): G

Occupation/Skill Level: 11H-1

Description:

Involves ensuring that the travel lock is engaged; grasping the carrying handle with one hand and depressing the gun platform latch with the other; lifting the gun from the M142 gun mount; and loosening the pintle mount locking handle and removing the mount.

Maintain an M220 Launcher System

Task Number: 071-056-0004

Category: Weapons

Duty Position(s): G, SL

Occupation/Skill Level: 11H-1

Description:

As per TM 9-1425-472-12, involves carrying out specified preventive maintenance checks and services on the M220 launcher system.



Perform a Preoperational Inspection of an M220  
Launcher System and Encased Missile

Task Number: 071-056-0006

Category: Weapons

Duty Position(s): G, SL, D, L

Occupation/Skill Level: 11H-1

Description:

Inspection of the launcher system involves inspecting the meter lights to ensure they are operable; inspecting the reticle light to ensure the crosshairs illuminate; inspecting the trigger for proper operation; inspecting the bridge clamp to ensure it is free of foreign matter and that it operates correctly; and inspecting the launch tube to ensure it is free of all foreign matter, its lugs are seated, and the tube latch is locked. Inspection of the encased missile involves inspecting the outside of the encased missile for dents, cracks, etc.; inspecting humidity indicator to ensure it is blue; inspecting dust cover to ensure it is seated on the electrical connector; and inspecting forward handling ring, quick release clamp, and indexing lugs.

Engage Targets with an M220 Launcher System

Task Number: 071-056-0009

Category: Weapons

Duty Position(s): G

Occupation/Skill Level: 11H-1

Description:

Includes gunner assuming and maintaining a firing position; acquiring the target in the launcher system sights; establishing a smooth tracking rate while keeping the crosshairs centered on the visible mass of the target; firing the missile; and keeping the crosshairs on center of the visible target mass until missile impact.

Engage Targets with an M220 Launcher System While  
Mounted on an M901 Vehicle

Task Number: ---

Category: Weapons

Duty Position(s): G

Occupation/Skill Level: 11H-1

Description:

While mounted on an M901 Vehicle, includes operation of turret to facilitate the acquisition of the target using Image Transfer Assembly; to establish a smooth tracking rate while keeping the crosshairs centered on the visible mass of the target; to fire the missile; and to keep the crosshairs on center of the visible mass of the target until missile impact.

Perform Immediate Action for an M220  
Launcher System Misfire

Task Number: 071-056-0010

Category: Weapons

Duty Position(s): G

Occupation/Skill Level: 11H-1

Description:

Following attempted firings, involves taking steps and precautions necessary to disarm/unload the M220 launcher system.

Collimate an AN/TAS-4 Series Night Sight  
to an M220 Launcher System Optical Sight

Task Number: 071-056-0011

Category: Weapons

Duty Position(s): G

Occupation/Skill Level: 11H-1

Description:

Involves turning on the night sight, adjusting the controls on the night sight for best focus of displayed image; installing the collimator and the collimator battery; sighting through the optical sight and adjusting the collimator azimuth and elevation adjustment knobs to align collimator reticle with optical sight cross hairs; sighting through the night sight and adjusting the azimuth and elevation knobs to align reticle cross hairs with collimator; checking to ensure optical sight cross hairs are still aligned with the collimator reticle; and removing the collimator and collimator battery.

Perform a System Self-Test on an M220A2 Launcher System

Task Number: 071-056-0013

Category: Weapons

Duty Position(s): G, SL, D, L

Occupation/Skill Level: 11H-1

Description:

The TOW weapon system checkout procedure is used with the missile guidance set (MGS) test to check the operational readiness of the MGS, including TOW vehicle power conditioner, or MGS battery, daysight and nightsight, TOW traversing unit, and launch tube.

### Tow a Tracked Vehicle

Task Number: 071-200-0002

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves instructions and cautions for towing a tracked vehicle, including disconnecting universal joints when towing more than 30 miles and/or at speeds above 10 miles per hour.

**Maintain the Air Cleaner System on an M113-Series Vehicle**

Task Number: 071-212-0001

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves lowering the trim vane and opening the power plant front access door; removing the housing and element from cover; removing the filter element from the housing; inspecting and cleaning the air cleaner element; installing the air cleaner element in the housing; securing the housing to the cover; and closing the power plant front access door and raising the trim vane.



Maintain the Electrical System on an M113-Series Vehicle

Task Number: 071-212-0002

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves inspecting the vehicle's electrical system following procedures prescribed in TM 9-2350-261-10 and/or TM 9-2300-257-10; ensuring that all uncorrected faults are properly corrected (within operator's realm of responsibility); and uncorrectable faults are properly recorded and reported. Includes determining when batteries need recharging and visual check of vehicle wiring for wear.

Maintain the Brake System on an M113-Series Vehicle

Task Number: 071-212-0003

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves inspecting for proper installation of the steering lever assemblies; inspecting for proper operation of the steering levers; inspecting the interior of the engine compartment for cables and other lines that have become detached from their restraints; inspecting the steering and braking linkage; ensuring that all uncorrected faults are properly corrected (within operator's realm of responsibility); and uncorrectable faults are properly recorded and reported.

Maintain the Cooling System on an M113-Series Vehicle

Task Number: 071-212-0004

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves inspecting the vehicle's cooling system following procedures prescribed in TM 9-2300-257-10 and/or TM 9-2350-0261-10; ensuring that all uncorrected faults are properly corrected (within operator's realm of responsibility); and uncorrectable faults are properly recorded and reported. Includes inspecting for leaks, determining coolant level, and adding replacement.

Maintain the Engine on an M113-Series Vehicle

Task Number: 071-212-0005

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves lowering the trim vane and opening the power plant front access door; inspecting fluid levels in the vehicle's engine and changing lubricants as required; inspecting fluid levels in the final drives; inspecting differential oil levels; inspecting the engine compartment for missing or loose bolts, screws, and nuts; inspecting the universal joints; inspecting all electrical wires and connectors; inspecting all hoses, fluid lines, clamps, and connectors; lubricating as required; inspecting all drive belts; inspecting the airbox heater accumulator, inspecting all flexible air intake ducts; raising the trim vane and closing the power plant front access door; ensuring that all uncorrected faults are properly corrected (within operator's realm of responsibility); and uncorrectable faults are properly recorded and reported.

Maintain the Fuel System on an M113-Series Vehicle

Task Number: 071-212-0006

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves inspecting the vehicle's fuel system following procedures prescribed in TM 9-2300-257-10 or TM 9-2350-261-10; ensuring that all uncorrected faults are properly corrected (within operator's realm of responsibility); and uncorrectable faults are properly recorded and reported. Includes locating, removing, cleaning and replacing fuel filter screen, primary and secondary fuel filters, drain valves, fuel cutoff cocks and operation of fuel access combat lock. Involves determining when vehicle fuel tanks are full and when scheduled or required maintenance is to be performed.

Maintain the Steering System on an M113-Series Vehicle

Task Number: 071-212-0007

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves operating the differential steering levers, pivot steering levers, and shift lever in all driving ranges; steering the vehicle using the differential steering levers and pivot steering system while checking for unusual noises, binding, grabbing, etc; ensuring that all uncorrected faults are properly corrected (within operator's realm of responsibility); and uncorrectable faults are properly recorded and reported.

Maintain the Transmission System on an M113-Series Vehicle

Task Number: 071-212-0008

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves ensuring vehicle is on level ground and brakes are set and locked; removing engine access panel; starting engine; checking transmission using transmission shift lever; checking transmission oil level; adjusting transmission oil as required; shutting off engine; and reinstalling and securing engine access panel.

Maintain the Personnel Heater on an M113-Series Vehicle

Task Number: 071-212-0009

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves inspecting the personnel heater and fuel lines for leaks; inspecting the heater and controls for damage; ensuring that nothing is blocking the exhaust, air inlet, or heat ducts; inspecting the personnel heater electrical circuits by pushing the PRESS-TO-TEST light cover; ensuring that all uncorrected faults are properly corrected (within operator's realm of responsibility); and uncorrectable faults are properly recorded and reported.



Maintain the Fire Suppression System  
on an M113-Series Vehicle

Task Number: 071-212-0010

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves inspecting vehicle's fixed fire suppression system and portable fire extinguisher, ensuring that all uncorrected faults are properly corrected (within operator's realm of responsibility); and uncorrectable faults are properly recorded and reported.

Maintain the Exhaust System on an M113-Series Vehicle

Task Number: 071-212-0011

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves visually inspecting exhaust system (all visible exterior parts) for cracks, defects, missing items, leaks; ensuring that all uncorrected faults are properly corrected (within operator's realm of responsibility); and uncorrectable faults are properly recorded and reported.

Maintain the Bilge System on an M113-Series Vehicle

Task Number: 071-212-0012

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves turning ON the master and bilge pump switches; checking to ensure that the bilge pump lights are ON; cleaning debris from the vicinity of the bilge pumps and intake screens; feeling for air at the bilge pump outlets or looking for a stream of water, if there is water in the bilges; checking the vent hole to ensure that it is open; ensuring that all uncorrected faults are properly corrected (within operator's realm of responsibility); and uncorrectable faults are properly recorded and reported.

Maintain the Hydraulic System on an M113-Series Vehicle

Task Number: 071-212-0013

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves inspecting the ramp fluid level by viewing the ramp hydraulic fluid level sight glass; inspecting the fluid level in the ramp fluid level reservoir; inspecting the entire hydraulic system for leaks; ensuring that all uncorrected faults are properly corrected (within operator's realm of responsibility); and uncorrectable faults are properly recorded and reported.

Maintain the Track and Suspension System  
on an M113-Series Vehicle

Task Number: 071-212-0014

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves inspecting and classifying any leaks found in the vicinity of the vehicle's road wheel hubs and idler wheel hubs; checking beneath the vehicle for loose or missing hull access and drain plugs; tightening loose plugs; inspecting the road wheels, idler arms, and idler wheels; inspecting the final drive bearings; inspecting the sprockets and sprocket bolts; inspecting the shock absorbers; inspecting track shoes and pins; removing, installing, and adjusting track and track pads; inspecting the roadwheel arms and torsion bars; inspecting the wheel hubs; ensuring that all uncorrected faults are properly corrected (within operator's realm of responsibility); and uncorrectable faults are properly recorded and reported.

Maintain the Hull on an M113-Series Vehicle

Task Number: 071-212-0015

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves visually inspecting vehicle's exterior for damage, missing items, etc.; inspecting hatches; ramp, ramp lock, and troop door; inspecting interior of vehicle for damage or leaks; inspecting seats; inspecting towing pintle and safety pin; inspecting trailer light receptacle; inspecting vehicle's interior lighting system; inspecting driving lights; inspecting machine gun mount; inspecting vehicle's antenna mounts; inspecting windshield (cold weather); inspecting swim shrouds; inspecting trim vane; and ensuring that all uncorrected faults are properly corrected (within operator's realm of responsibility); and uncorrectable faults are properly recorded and reported.

Operate the M19 Periscope on an M113-Series Vehicle

Task Number: 071-212-0019

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves installing the periscope in the driver's hatch; ensuring system is off; removing periscope power cable from its stowed position and connecting to periscope; turning the system on; adjusting head rest, adjusting periscope for best viewing; sighting through the periscope to drive vehicle over the directed route of travel; and removing and stowing the periscope when it is not in use.

**Start an M113-Series Vehicle Using Auxiliary Power**

Task Number: 071-212-0020

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves identifying need to use auxiliary power, decision as to method to be used and precautions taken to start vehicle without injury to personnel or damage to vehicle, and starting vehicle. May involve starting vehicle through the use of slave cables and outside electrical source or by towing.



### Drive an M113-Series Vehicle

Task Number: 071-212-0021

Category: Automotive

Duty Position(s): D

Occupation/Skill Level: 11H-1

Description:

Involves application of safety standards and techniques for operating the vehicle across varying terrain, under varying conditions of weather (e.g., extreme cold) and visibility (e.g., night), etc., without injury to personnel or damage to vehicle. Involves performing operational checks, applying required safety measures (e.g., wearing seat belt, using ground guides, giving warnings), applying vehicle starting procedures, setting gear selector as required, driving the vehicle at appropriate speeds based on specific conditions and instructions, monitoring driver controls and gages, and applying engine shutdown procedures after completion of mission.

Maintain Intercommunications Set AN/VIC-1  
on a Tracked Vehicle

Task Number: 071-810-0004

Category: Communications

Duty Position(s): D, G, L

Occupation/Skill Level: 11H-1

Description:

Involves inspecting the vehicle's intercom and all accessories following procedures prescribed in TM 11-5820-498-12 and/or TM 11-5820-401-10-2; ensuring that all uncorrected faults are properly corrected (within operator's realm of responsibility); and uncorrectable faults are properly recorded and reported.

Load an M243 or M259 Smoke Grenade Launcher

Task Number: 071-034-0001

Category: Weapons

Duty Position(s): L

Occupation/Skill Level: 11H-1

Description:

Involves ensuring that grenade launcher ARM/OFF switch is in OFF position, removing the rubber covers from tubes, loading a smoke grenade into each tube, engaging tip plug at bottom of tube, rotating 1/2 turn, loading spare grenades into each stowage box, and closing and securing stowage box cover.

Unload an M243 or M259 Smoke Grenade Launcher

Task Number: 071-034-0002

Category: Weapons

Duty Position(s): L

Occupation/Skill Level: 11H-1

Description:

Involves ensuring that grenade launcher ARM/OFF switch is in OFF position, removing grenades from dischargers and placing in ammunition containers, then replacing rubber covers on launch tubes and closing and securing doors on grenade stowage boxes.

Perform Misfire Procedures on an M243 Smoke Grenade Launcher

Task Number: 071-034-0003

Category: Weapons

Duty Position(s): L

Occupation/Skill Level: 11H-2

Description:

When a grenade misfires, involves ensuring that grenade is fully seated and informing the gunner to attempt to refire. If grenade does not fire, involves placing grenade in another tube and informing the gunner to refire. If grenade still does not fire, involves removing grenade and treating as dud.

Maintain an M243 or M259 Smoke Grenade Launcher

Task Number: 071-034-0007

Category: Weapons

Duty Position(s): L

Occupation/Skill Level: 11H-1

Description:

As per TM 9-2350-259-10, involves carrying out specified preventive maintenance checks and services on the M243 or M259 Smoke Grenade Launchers. Includes inspecting the dischargers for damage and serviceability, removing any buildup of grease or dirt from the dischargers, and reporting any deficiencies to supervisor.

Load an M220 Launcher

Task Number: 071-056-0007

Category: Weapons

Duty Position(s): L

Occupation/Skill Level: 11H-1

Description:

Involves locking the azimuth and elevation locks, raising the bridge clamp, ensuring the trigger protective cover is down, preparing the encased missile for loading, inserting the indexing lugs into the launch tube indexing slots, seating the encased missile in the tube, lowering the bridge clamp, closing the locking handle, and raising the arming lever to arm the launcher.

Unload an M220 Launcher

Task Number: 071-056-0008

Category: Weapons

Duty Position(s): L

Occupation/Skill Level: 11H-1

Description:

Involves lowering the trigger protective cover, locking azimuth and elevation locks, lowering the arming lever, raising the locking handle, opening the bridge clamp, removing the encased or misfired missile or expended missile case from the launch tube, and preparing it for restowage or clearing.



Load a Dual Launcher While Mounted on an M901 Vehicle

Task Number: 071-056-0020

Category: Weapons

Duty Position(s): L

Occupation/Skill Level: 11H-1

Description:

With launcher in LOAD position, task involves pulling encased missile from missile storage rack, preparing the encased missile for loading, and loading it in the launcher. The task also may entail opening/closing the cargo hatch and erecting/stowing side armor.

Unload a Dual Launcher While Mounted on an M901 Vehicle

Task Number: 071-056-0021

Category: Weapons

Duty Position(s): L

Occupation/Skill Level: 11H-1

Description:

With launcher in UNLOAD position, involves removing encased or misfired missiles or expended missile cases from the launcher and preparing for restowage or clearing. The task also may include opening/closing the cargo hatch and erecting/stowing the side armor.

Stow M220 Encased Missiles in a Missile Storage Rack

Task Number: 071-056-0061

Category: Weapons

Duty Position(s): L

Occupation/Skill Level: 11H-1

Description:

Involves storing encased missiles in missile storage rack which is located on the right interior wall and provides space for 10 TOW missiles.

## APPENDIX C

### FORMS USED TO COLLECT BACKGROUND INFORMATION

#### TOE Unit Soldiers

##### Purpose

This information is being collected as part of an analysis of problems affecting the use of the Improved TOW Vehicle (ITV). The analysis is being performed under contract to the U.S. Army Research Institute, which is working in support of the U.S. Army Infantry School, Fort Benning, Georgia. The analysis looks at both ITV tasks and the vehicle itself. The intent is to get a clear picture of the problems, so these same problems do not arise on systems that follow the ITV.

You will be asked to answer the following types of questions:

##### **ITV tasks:**

- Which tasks are difficult to learn?
- Which tasks are difficult to perform?
- Which tasks take a long time to train?
- Which tasks are difficult to remember?
- How frequently are tasks performed?
- What proportion of the 11H MOS performs the task?
- Overall, which tasks are the biggest problem tasks? Why?

##### **ITV:**

- Does operation of the vehicle entail unnecessary safety hazards?
- Do you have difficulty using certain equipment?
- Does the vehicle cause you problems doing your assigned jobs?

##### **Best Features:**

- What are the best features of the ITV and ITV training?

## BACKGROUND INFORMATION

### Instructors

#### Purpose

This information is being collected as part of an analysis of problems affecting the use of the Improved TOW Vehicle (ITV). The analysis is being performed under contract to the U.S. Army Research Institute, which is working in support of the U.S. Army Infantry School, Fort Benning, Georgia. The analysis looks at both ITV tasks and the vehicle itself. The intent is to get a clear picture of the problems, so these same problems do not arise on systems that follow the ITV.

You will be asked to answer the following types of questions:

#### ITV tasks:

- Which tasks are difficult to learn?
- Which tasks are difficult to perform?
- Which tasks take a long time to train?
- Which tasks are difficult to remember?
- How frequently are tasks performed?
- What proportion of the 11H MOS performs the task?
- Overall, which tasks are the biggest problem tasks? Why?

#### ITV:

- Does operation of the vehicle entail unnecessary safety hazards?
- Do you have difficulty using certain equipment?
- Does the vehicle cause you problems doing your assigned jobs?

#### Best Features:

- What are the best features of the ITV and ITV training?

## BACKGROUND INFORMATION

### OSUT Soldiers

#### Purpose

This information is being collected as part of an analysis of problems affecting the use of the Improved TOW Vehicle (ITV). The analysis is being performed under contract to the U.S. Army Research Institute, which is working in support of the U.S. Army Infantry School, Fort Benning, Georgia. The analysis looks at both ITV tasks and the vehicle itself. The intent is to get a clear picture of the problems, so these same problems do not arise on systems that follow the ITV.

You will be asked to answer the following types of questions:

#### ITV tasks:

- Which tasks are difficult to learn?
- Which tasks are difficult to perform?
- Which tasks take a long time to train?
- Overall, which tasks are the biggest problem tasks? Why?

#### Best Features:

- What are the best features of the ITV and ITV training?

## APPENDIX D

### FORMS USED FOR PERSONAL EXPERIENCE DATA FOR TOE UNIT SOLDIERS AND INSTRUCTORS

#### TOE Unit Soldiers

1. What is your pay grade?

- |                          |                          |
|--------------------------|--------------------------|
| <input type="radio"/> E1 | <input type="radio"/> E5 |
| <input type="radio"/> E2 | <input type="radio"/> E6 |
| <input type="radio"/> E3 | <input type="radio"/> E7 |
| <input type="radio"/> E4 | <input type="radio"/> E8 |

2. What is your current MOS?

- ☐ 11H
- ☐ 11B
- ☐ 11C
- ☐ 11M
- ☐ Other (List) \_\_\_\_\_

3. In what ITV duty positions have you served?

- ☐ Loader
- ☐ Driver
- ☐ Gunner
- ☐ Squad Leader

4. How long did you serve in each duty position?

- ☐ Loader \_\_\_\_\_
- ☐ Driver \_\_\_\_\_
- ☐ Gunner \_\_\_\_\_
- ☐ Squad Leader \_\_\_\_\_

5. How long have you served in your current duty position? \_\_\_\_\_

6. Have you ever served as an ITV instructor?

7. If yes, how long did you serve as an instructor?

8. Did you ever train at the National Training Center as an ITV crew member?

9. Have you had other special or unique experiences working with the ITV that you feel give you a broader perspective or better understanding of the system and its use?

## PERSONAL EXPERIENCE

### Instructors

1. What is your pay grade?

- |                          |                          |
|--------------------------|--------------------------|
| <input type="radio"/> E1 | <input type="radio"/> E5 |
| <input type="radio"/> E2 | <input type="radio"/> E6 |
| <input type="radio"/> E3 | <input type="radio"/> E7 |
| <input type="radio"/> E4 | <input type="radio"/> E8 |

2. What is your current MOS?

- ☐ 11H
- ☐ 11B
- ☐ 11C
- ☐ 11M
- ☐ Other (List) \_\_\_\_\_

3. How long have you served as an ITV instructor? \_\_\_\_\_

4. In what ITV duty positions have you served?

- ☐ Loader
- ☐ Driver
- ☐ Gunner
- ☐ Squad Leader

5. How long did you serve in each duty position?

- ☐ Loader \_\_\_\_\_
- ☐ Driver \_\_\_\_\_
- ☐ Gunner \_\_\_\_\_
- ☐ Squad Leader \_\_\_\_\_

6. Did you ever train at the National Training Center as an ITV crew member?

7. Have you had other special or unique experiences working with the ITV that you feel give you a broader perspective or better understanding of the system and its use?



## APPENDIX E

### REFERENCES USED TO PREPARE TASK DESCRIPTIONS

- Department of the Army. (undated). Battle drills for the antiarmor platoon (ARTEP 7-91-Drill). Washington, DC: Author.
- Department of the Army. (1979, June). Operator's manual for combat vehicle, anti-tank improved TOW vehicle, M901 (TM 9-2350-259-10). Washington, DC: Author.
- Department of the Army. (1985, July). Soldier's manual, heavy antiarmor weapons infantryman MOS 11H (STP 7-11H1-SM). Washington, DC: Author.
- Department of the Army. (1985, July). Soldier's manual, heavy antiarmor weapons infantryman MOS 11H (STP 7-11H24-SM). Washington, DC: Author.
- Department of the Army. (1987, October). Soldier's manual of common tasks (STP 21-1 SMCT). Washington, DC: Author.
- U.S. Army Infantry School. (1988, March). Improved TOW vehicle (ITV) gunner training. Fort Benning, GA: Author.
- U.S. Army Training and Doctrine Command. (1980, September). Job and task analysis worksheets (TRADOC Form 550). Fort Monroe, VA: Author.

## APPENDIX F

### INSTRUCTIONS ON THE USE OF THE ECA RATING SCALES

#### Rating 1

One task appears on each page that follows. Rate each task by circling 1, 2, 3, 4, or 5 under A, B, C, D, E, and F as described below. Feel free to comment on problems related to the tasks in the space provided.

The information provided below will help you understand what you are rating. Read the descriptions carefully before beginning your ratings and refer back to this page as often as necessary during the rating process.

- A. Percent Performing: What proportion of the relevant MOS and skill level performs this task?
- B. Task Performance Difficulty: How difficult is it, for the average soldier, of the proper skill level and in the proper MOS, to perform this task? Consider both cognitive and physical difficulty. (In rating Task Performance Difficulty, assume that the task is being performed under conditions which typically are present in field and combat environments, e.g., cold or hot weather, limited visibility, fatigue, stress.)
- C. Frequency Rate: On the average, how often is this task performed by the average soldier of the proper skill level and in the proper MOS?
- D. Task Learning Difficulty: How difficult is it for the average soldier, in the appropriate MOS and of the appropriate skill level, to learn this task?
- E. Time to Train: How much time is required to train the average soldier, of the proper skill level and in the proper MOS, to perform this task to standard?
- F. Decay Rate: Given this task, how much proficiency is lost by the average soldier from the end of his formal training until he first performs the task in the field? (Assume that the task is performed within a reasonable period of time after training and is performed by an average soldier of the proper skill level and in the proper MOS.)

## APPENDIX G

### EXAMPLES OF RATING FORMS INVOLVING THE USE OF TWO ALTERNATIVE, FORCED-CHOICE METHOD

#### Engage a Target

##### Description:

Involves the crew moving to TOW firing position and squad leader giving commands; gunner attempting to acquire and identify the target and determining if it can be engaged; loader checking backblast area and standing ready to load another missile, and driver moving vehicle at command from squad leader.

---

This task is a problem task. \_\_\_\_

This task is not a problem task. \_\_\_\_

If you feel it is a problem task, briefly explain why in the space provided.

---

---

---

Engage a Target

---

This task is a problem task. \_\_\_\_

This task is not a problem task. \_\_\_\_

If you feel it is a problem task, briefly explain why in the space provided.

---

---

---

## APPENDIX H

### FORM USED TO COLLECT INFORMATION ON THE BEST FEATURES OF THE ITV AND ITV TRAINING

Two of the biggest problems faced by developers of new systems is knowing what to ask for in the system and knowing how to ask for it. To help overcome these problems, information is needed about the best features of the Improved Tow Vehicle (ITV) and ITV training. What is good about the ITV and ITV training?

Please write your answers in the spaces provided.

#### ITV

automotive: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

turret: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

weapons: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

communications: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

#### ITV Training

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# APPENDIX I

## ECA TASK RATINGS AND ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA

### DECONTAMINATE EQUIPMENT USING NBC M11 DECONTAMINATING APPARATUS

#### TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	1	3	2.00	3	2	2.50	2.25
TPD	1	1	1.00	1	3	2.00	1.50
FR	1	2	1.50	2	2	2.00	1.75
TLD	1	1	1.00	1	3	2.00	1.50
TT	1	1	1.00	1	1	1.00	1.00
DR	3	2	2.50	3	2	2.50	2.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 7.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 50.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 22.2

---

	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM	X		1	50			0	0	1	25
NOT PROBLEM		X	1	50	X	X	2	100	3	75

#### ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = DECONTAMINATE UNIT EQUIPMENT

PP = 2

TT = 2.62

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 37.95

DECONTAMINATE EQUIPMENT USING NBC M11 DECONTAMINATING APPARATUS

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	2	4	1	2	2.25	2	2	3	5	2.33	2.29
TPD	1	1	1	3	1.50	2	1	1	1	1.25	1.37
FR	2	1	2	4	2.25	1	1	2	4	2.00	2.12
TLD	1	1	1	2	1.25	3	1	1	2	2.00	1.62
TT	1	1	1	4	1.75	1	1	2	4	1.75	1.75
DR	1	1	3	3	2.00	1	2	2	1	1.50	1.75

ECA TASK SCORE<sub>DESCRIPTION</sub> = 33.2

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 30.6

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 33.2

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = DECONTAMINATE UNIT EQUIPMENT

PP = 2

TT = 2.62

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 37.95

PERFORM EMERGENCY EVACUATION FROM THE ITV

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	1	4	2.50	3	2	2.50	2.50
TPD	3	1	2.00	2	4	3.00	2.50
FR	1	2	1.50	1	2	1.50	1.50
TLD	1	1	1.00	1	4	2.50	1.75
TT	1	1	1.00	1	1	1.00	1.00
DR	1	1	1.00	3	2	2.50	1.75

ECA TASK SCORE<sub>DESCRIPTION</sub> = 7.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 70.3

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 28.7

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM	X		1	50	X		1	50	2	50
NOT PROBLEM		X	1	50		X	1	50	2	50

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = ESCAPE FROM DISABLED ITV

PP = 2

TT = 1.70

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 34.88



PERFORM EMERGENCY EVACUATION FROM THE ITV

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	4	3.25	3	2	4	1	2.50	2.87
TPD	1	1	1	1	1.00	1	2	1	1	1.25	1.12
FR	2	2	2	1	1.75	3	1	2	4	2.50	2.12
TLD	1	1	1	1	1.00	2	1	1	1	1.50	1.25
TT	1	1	1	1	1.00	1	1	1	1	1.00	1.00
DR	1	1	1	1	1.00	2	1	1	3	1.75	1.37

ECA TASK SCORE<sub>DESCRIPTION</sub> = 5.7

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 20.5

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 11.8

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	%	
PROBLEM			X		25					0	13	
NOT PROBLEM	X	X		X	75	X	X	X	X	100	88	

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = ESCAPE FROM DISABLED ITV

PP = 2

TT = 1.70

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 13.39

PERFORM EMERGENCY EVACUATION FROM THE ITV

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	2	1	1	1	1	1.20
TLD	1	1	1	1	2	1.20
TT	1	1	1	1	2	1.20

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	2	1	2	5	1	1.50	1.33
TLD	2	1	2	5	5	1.66	1.38
TT	1	1	1	5	1	1.00	1.11

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	2	5	1	2	1	1.50	1.38
TLD	3	5	1	2	1	1.75	1.50
TT	3	5	3	3	1	2.50	1.54

ECA TASK SCORE DESCRIPTION = 2.0

ECA TASK SCORE NO DESCRIPTION = 6.6

ECA TASK SCORE OVERALL (OSUT) = 3.2

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X		X	4	100	100

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	0
NO PROBLEM	X		X	X	X	4	100	100

SUPERVISE TOWING OF A VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	2	1	1.50	4	3	3.50	2.50
TPD	2	3	2.50	3	2	2.50	2.50
FR	5	1	1.00	1	1	1.00	1.00
TLD	1	2	1.50	1	2	1.50	1.50
TT	1	5	1.00	1	1	1.00	1.00
DR	1	4	2.50	2	2	2.00	2.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 14.1

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 26.3

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 21.1

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM	X	X	2	100			0	0	2	50
NOT PROBLEM			0	0	X	X	2	100	2	50

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = PREPARE TRACKED VEHICLE FOR TOWING

PP = 1

TT = 1.98

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 22.00

SUPERVISE TOWING OF A VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	2	2	1	3	2.00	3	2	3	2	2.50	2.25
TPD	3	3	1	2	2.25	4	3	1	1	2.25	2.25
FR	1	1	1	4	1.75	2	1	2	5	1.67	1.71
TLD	1	1	1	5	1.00	3	2	1	1	2.00	1.57
TT	1	1	1	2	1.25	1	1	1	1	1.00	1.12
DR	2	2	1	2	1.75	1	1	1	2	1.25	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 17.2

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 23.4

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 23.0

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM				X	25					0	13
NOT PROBLEM	X	X	X		75	X	X	X	X	100	88

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = PREPARE TRACKED VEHICLE FOR TOWING

PP = 1

TT = 1.98

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 22.89

CHARGE A BATTERY USING A PP-7382/TAS BATTERY CHARGER

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	3	1	2.00	3	2	2.50	2.25
TPD	1	2	1.50	1	1	1.00	1.25
FR	3	1	2.00	3	3	3.00	2.50
TLD	1	2	1.50	1	1	1.00	1.25
TT	1	1	1.00	1	2	1.50	1.25
DR	1	4	2.50	1	3	2.00	2.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 22.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 22.3

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 24.7

	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = OPERATE TOW BATTERY CHARGER

PP = 3

TT = 1.24

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 28.89

CHARGE A BATTERY USING A PP-7382/TAS BATTERY CHARGER

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	1	1	1	4	1.75	2	1	2	2	1.75	1.75
TPD	1	1	1	1	1.00	2	1	1	1	1.25	1.12
FR	1	1	3	4	2.25	3	1	3	4	2.75	2.50
TLD	1	1	1	1	1.00	3	1	1	1	2.00	1.50
TT	1	1	1	1	1.00	1	1	1	2	1.25	1.12
DR	2	3	1	1	1.75	2	3	1	2	2.00	1.87

ECA TASK SCORE<sub>DESCRIPTION</sub> = 6.9

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 30.1

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 15.6

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = OPERATE TOW BATTERY CHARGER

PP = 3

TT = 1.24

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 22.06

DESTROY SUPPLIES AND EQUIPMENT

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	1	1	1.00	3	4	3.50	2.25
TPD	2	3	2.50	2	3	2.50	2.50
FR	1	1	1.00	1	5	1.00	1.00
TLD	1	2	1.50	2	2	2.00	1.75
TT	1	1	1.00	1	1	1.00	1.00
DR	2	4	3.00	2	3	2.50	2.75

ECA TASK SCORE<sub>DESCRIPTION</sub> = 11.3

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 43.8

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 27.1

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM		X	1	50			0	0	1	25
NOT PROBLEM	X		1	50	X	X	2	100	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = PERFORM EMERGENCY DESTRUCTION OF ITV WEAPON SYSTEM

PP = 2

TT = 2.33

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 42.80

DESTROY SUPPLIES AND EQUIPMENT

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	AVERAGE
PP	4	4	1	5	3.00	1	2	2	1	1.50	2.14
TPD	1	1	1	1	1.00	1	2	1	1	1.25	1.12
FR	1	1	3	1	1.50	3	1	1	5	1.67	1.57
TLD	1	1	1	1	1.00	1	2	1	1	1.25	1.12
TT	1	1	1	1	1.00	5	1	1	1	1.00	1.00
DR	2	2	2	2	2.00	2	2	2	2	1.75	1.87

ECA TASK SCORE DESCRIPTION = 9.0

ECA TASK SCORE NO DESCRIPTION = 6.8

ECA TASK SCORE OVERALL (IN) = 8.0

	DESCRIPTION					NO DESCRIPTION					OVERALL
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	%
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = PERFORM EMERGENCY DESTRUCTION OF ITV WEAPON SYSTEM

PP = 2

TT = 2.33

ECA TASK SCORE OVERALL (UNIT + AOSP DATA) = 12.73



# DESTROY SUPPLIES AND EQUIPMENT

## ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	2	1	1	1.20
TLD	1	1	2	1	1	1.20
TT	1	1	1	1	1	1.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	5	1	1	5	1	1.00	1.13
TLD	5	1	1	5	1	1.00	1.13
TT	5	1	1	5	1	1.00	1.00

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	5	1	1	1	1.00	1.08
TLD	1	5	1	1	1	1.00	1.08
TT	1	5	1	2	1	1.25	1.08

ECA TASK SCORE DESCRIPTION = 1.3

ECA TASK SCORE NO DESCRIPTION = 1.3

ECA TASK SCORE OVERALL (OSUT) = 1.3

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X		X	4	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X		X	4	100	100

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	0
NO PROBLEM	X		X	X	X	4	100	100

SUPERVISE ZEROING OF ORGANIC WEAPONS

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	1	4	2.50	4	3	3.50	3.00
TPD	1	1	1.00	1	4	2.50	1.75
FR	3	2	2.50	3	5	3.00	2.67
TLD	1	1	1.00	1	3	2.00	1.50
TT	1	1	1.00	2	1	1.50	1.25
DR	1	3	2.00	1	3	2.00	2.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 12.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 157.5

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 52.6

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM	X		1	50	X		1	50	2	50
NOT PROBLEM		X	1	50		X	1	50	2	50

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

SUPERVISE ZEROING OF ORGANIC WEAPONS

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	1	1	1	1.75	3	3	4	3	3.25	2.50
TPD	2	2	2	2	2.00	3	2	2	1	2.00	2.00
FR	2	2	2	2	2.00	1	2	3	5	2.00	2.00
TLD	1	2	2	1	1.50	1	1	1	1	1.50	1.50
TT	2	2	1	4	2.25	3	1	2	1	1.50	1.87
DR	2	2	2	2	2.00	2	2	1	1	1.75	1.87

ECA TASK SCORE<sub>DESCRIPTION</sub> = 47.3

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 51.2

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 52.7

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	% %	
PROBLEM				X	25					0	13	
NOT PROBLEM	X	X	X		75	X	X	X	X	100	88	

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

FIRE AN M243 OR M259 SMOKE GRENADE LAUNCHER

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	1	1	1.00	4	5	4.00	2.00
TPD	1	1	1.00	1	5	1.00	1.00
FR	1	1	1.00	1	5	1.00	1.00
TLD	1	1	1.00	1	5	1.00	1.00
TT	1	1	1.00	1	5	1.00	1.00
DR	1	3	2.00	2	5	2.00	2.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 2.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 8.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 4.0

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM		X	1	50			0	25	1	25
NOT PROBLEM	X		1	50	X	X	2	100	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = FIRE ITV M243 SMOKE GRENADE LAUNCHER  
(071-316-2543)

PP = 1

TT = 2.07

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 3.12

FIRE AN M243 OR M259 SMOKE GRENADE LAUNCHER

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	3	2	1	3	2.25	2	1	3	5	2.00	2.14
TPD	1	1	1	1	1.00	2	1	1	1	1.25	1.12
FR	1	1	1	2	1.25	1	1	2	5	1.33	1.29
TLD	1	1	1	1	1.00	2	1	1	1	1.50	1.25
TT	1	1	1	1	1.00	1	1	1	1	1.00	1.00
DR	1	1	1	1	1.00	1	1	1	2	1.25	1.12

ECA TASK SCORE DESCRIPTION = 2.8

ECA TASK SCORE NO DESCRIPTION = 6.3

ECA TASK SCORE OVERALL (IN) = 4.4

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	%	
PROBLEM					0					0	0	
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100	

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = FIRE ITV M243 SMOKE GRENADE LAUNCHER  
(071-316-2534)

PP = 1

TT = 2.07

ECA TASK SCORE OVERALL (UNIT + AOSP DATA) = 4.89

FIRE AN M243 OR M259 SMOKE GRENADE LAUNCHER

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	5	1	1	1	1	1.00
TLD	5	1	1	1	1	1.00
TT	5	1	1	1	1	1.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	5	5	5	5	1	1.00	1.00
TLD	5	5	5	5	1	1.00	1.00
TT	5	5	5	5	1	1.00	1.00

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	1	1	1	5	1.00	1.00
TLD	1	1	1	1	5	1.00	1.00
TT	1	1	1	1	5	1.00	1.00

ECA TASK SCORE DESCRIPTION = 1.0

ECA TASK SCORE NO DESCRIPTION = 1.0

ECA TASK SCORE OVERALL (OSUT) = 1.0

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM			X			1	25	11
NO PROBLEM	X	X			X	3	75	89

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	8
NO PROBLEM	X	X	X	X		4	100	92

CONDUCT MOUNTING OF AN M220 LAUNCHER SYSTEM  
ON AN M901 VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	3	4	3.50	4	3	3.50	3.50
TPD	4	2	3.00	2	3	2.50	2.75
FR	2	3	2.50	3	4	3.50	3.00
TLD	1	3	2.00	1	3	2.00	2.00
TT	1	2	1.50	2	1	1.50	1.50
DR	1	3	2.00	1	3	2.00	2.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 157.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 183.8

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 173.3

	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM	X		1	50			0	0	1	25
NOT PROBLEM		X	1	50	X	X	2	100	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

CONDUCT MOUNTING OF AN M220 LAUNCHER SYSTEM ON AN M901 VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	2	3	3.25	3	3	4	3	3.25	3.25
TPD	2	1	2	3	2.00	3	3	2	1	2.25	2.12
FR	2	2	3	3	2.50	4	4	4	5	4.00	3.14
TLD	2	2	2	3	2.25	3	3	2	1	2.75	2.50
TT	2	2	2	4	2.50	2	2	2	2	2.00	2.25
DR	2	2	2	4	2.50	2	2	2	2	2.00	2.25

ECA TASK SCORE DESCRIPTION = 228.5

ECA TASK SCORE NO DESCRIPTION = 321.8

ECA TASK SCORE OVERALL (IN) = 274.7

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM			X		25			X	X	50	38
NOT PROBLEM	X	X		X	75	X	X			50	63

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.



CONDUCT MOUNTING OF AN M220 LAUNCHER SYSTEM ON AN M901 VEHICLE

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	2	1	1	1	2	1.40
TLD	1	1	1	1	2	1.20
TT	2	2	2	2	2	2.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	3	5	2	1	1	1.75	1.56
TLD	3	5	2	1	1	1.75	1.44
TT	1	5	2	1	4	2.00	2.00

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	3	2	2	1	1.80	1.64
TLD	1	2	1	2	1	1.40	1.43
TT	2	2	2	3	1	2.00	2.00

ECA TASK SCORE DESCRIPTION = 4.5

ECA TASK SCORE NO DESCRIPTION = 5.0

ECA TASK SCORE OVERALL (OSUT) = 4.7

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM		X				1	20
NO PROBLEM	X		X	X	X	4	80

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	10
NO PROBLEM	X	X	X	X	X	5	100	90

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	7
NO PROBLEM	X	X	X	X	X	5	100	93

CONDUCT DISMOUNTING OF AN M220 LAUNCHER SYSTEM  
FROM AN M901 VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	2	4	3.00	4	3	3.50	3.25
TPD	3	2	2.50	1	3	2.00	2.25
FR	2	3	2.50	3	4	3.50	3.00
TLD	1	3	2.00	2	3	2.50	2.25
TT	1	2	1.50	2	1	1.50	1.50
DR	2	3	2.50	1	3	2.00	2.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 140.6

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 183.8

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 166.6

	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM	X		1	50			0	0	1	25
NOT PROBLEM		X	1	50	X	X	2	100	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

CONDUCT DISMOUNTING OF AN M220 LAUNCHER SYSTEM FROM AN M901 VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	2	3	3.25	3	3	4	3	3.25	3.25
TPD	2	1	2	3	2.00	3	4	2	1	2.50	2.25
FR	2	2	3	3	2.50	4	4	4	4	4.00	3.25
TLD	2	2	2	3	2.25	3	3	2	1	2.75	2.50
TT	2	2	2	4	2.50	2	2	1	2	2.00	2.25
DR	2	2	2	4	2.50	2	3	1	2	2.00	2.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 228.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 357.5

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 300.8

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM			X		25			X		25	25
NOT PROBLEM	X	X		X	75	X	X		X	75	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

CONDUCT DISMOUNTING OF AN M220 LAUNCHER SYSTEM FROM AN M901 VEHICLE

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	1	2	1	1.20
TLD	1	1	1	2	2	1.40
TT	2	2	2	2	2	2.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	2	5	1	1	1	1.25	1.22
TLD	2	5	1	1	1	1.25	1.33
TT	1	5	1	1	4	1.75	1.89

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	3	2	2	1	1.80	1.43
TLD	1	3	1	2	1	1.60	1.43
TT	2	2	2	3	1	2.00	1.93

ECA TASK SCORE DESCRIPTION = 3.1

ECA TASK SCORE NO DESCRIPTION = 5.8

ECA TASK SCORE OVERALL (OSUT) = 3.9

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM		X	X			2	40
NO PROBLEM	X			X	X	3	60

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM	X					1	20	30
NO PROBLEM		X	X	X	X	4	80	70

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	20
NO PROBLEM	X	X	X	X	X	5	100	80

CONDUCT PLACEMENT OF A DISMOUNTED M220 LAUNCHER  
SYSTEM INTO ACTION

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	2	4	3.00	4	3	3.50	3.25
TPD	3	1	2.00	1	4	2.50	2.25
FR	2	2	2.00	3	2	2.50	2.25
TLD	1	1	1.00	1	3	2.00	1.50
TT	1	2	1.50	2	1	1.50	1.50
DR	2	2	2.00	1	3	2.00	2.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 36.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 131.3

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 74.0

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM	X		1	50			0	0	1	25
NOT PROBLEM		X	1	50	X	X	2	100	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

CONDUCT PLACEMENT OF A DISMOUNTED M220 LAUNCHER SYSTEM INTO ACTION

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	2	1	3	2.50	4	3	4	1	3.00	2.75
TPD	2	2	1	2	1.75	3	3	1	1	2.00	1.87
FR	2	2	3	3	2.50	3	4	3	5	3.33	2.86
TLD	2	2	1	3	2.00	3	3	1	1	2.50	2.25
TV	2	2	1	4	2.25	2	2	1	1	1.50	1.87
DR	2	2	1	3	2.00	3	2	1	3	2.25	2.12

ECA TASK SCORE<sub>DESCRIPTION</sub> = 98.4

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 168.8

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 132.1

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0				X	25	13
NOT PROBLEM	X	X	X	X	100	X	X	X		75	88

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

CONDUCT PLACEMENT OF A DISMOUNTED M220 LAUNCHER SYSTEM INTO ACTION

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	<u>OSUT1</u>	<u>OSUT2</u>	<u>GROUP ED OSUT3</u>	<u>OSUT4</u>	<u>OSUT5</u>	<u>AVERAGE</u>
TPD	5	1	1	1	1	1.00
TLD	5	1	1	2	1	1.25
TT	5	1	1	2	2	1.50

	<u>OSUT1</u>	<u>OSUT2</u>	<u>GROUP EFD OSUT3</u>	<u>OSUT4</u>	<u>OSUT5</u>	<u>AVERAGE</u>	<u>GROUPS ED &amp; EFD AVERAGE</u>
TPD	2	5	1	2	1	1.50	1.25
TLD	2	5	1	1	1	1.25	1.25
TT	1	5	1	1	1	1.00	1.25

	<u>OSUT1</u>	<u>OSUT2</u>	<u>GROUP EFND OSUT3</u>	<u>OSUT4</u>	<u>OSUT5</u>	<u>AVERAGE</u>	<u>GROUPS ED, EFD, EFND AVERAGE</u>
TPD	2	2	1	2	1	1.60	1.38
TLD	2	2	1	2	1	1.60	1.38
TT	2	1	1	3	1	1.60	1.38

ECA TASK SCORE DESCRIPTION = 2.0

ECA TASK SCORE NO DESCRIPTION = 4.1

ECA TASK SCORE OVERALL (OSUT) = 2.6

	<u>OSUT1</u>	<u>OSUT2</u>	<u>GROUP FD OSUT3</u>	<u>OSUT4</u>	<u>OSUT5</u>	<u>TOTAL</u>	<u>%</u>
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	<u>OSUT1</u>	<u>OSUT2</u>	<u>GROUP EFD OSUT3</u>	<u>OSUT4</u>	<u>OSUT5</u>	<u>TOTAL</u>	<u>%</u>	<u>GROUPS FD &amp; EFD %</u>
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

	<u>OSUT1</u>	<u>OSUT2</u>	<u>GROUP EFND OSUT3</u>	<u>OSUT4</u>	<u>OSUT5</u>	<u>TOTAL</u>	<u>%</u>	<u>GROUPS TD, EFD, EFND %</u>
PROBLEM		X				1	20	7
NO PROBLEM	X		X	X	X	4	80	93

OPERATE THE SQUAD LEADER'S PERISCOPE ON AN M901 VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	3	2	2.50	2	2	2.00	2.25
TPD	1	3	2.00	1	2	1.50	1.75
FR	3	2	2.50	1	2	1.50	2.00
TLD	1	3	2.00	1	1	1.00	1.50
TT	1	2	1.50	1	1	1.00	1.25
DR	1	4	2.50	1	3	2.00	2.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 93.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 9.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 33.2

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM			0	0	X	X	2	100	2	50
NOT PROBLEM	X	X	2	100			0	0	2	50

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = OPERATE ITV SQUAD LEADERS PERISCOPE  
(071-316-2537)

PP = 2

TT = 1.57

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 35.48



OPERATE THE SQUAD LEADER'S PERISCOPE ON AN M901 VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	3	3.00	2	3	4	1	2.50	2.75
TPD	1	1	1	1	1.00	2	1	2	1	1.50	1.25
FR	1	1	4	2	2.00	3	2	4	5	3.00	2.43
TLD	1	1	1	1	1.00	3	1	2	1	2.25	1.62
TT	1	1	1	1	1.00	2	1	1	1	1.50	1.25
DR	1	1	1	2	1.25	2	1	1	2	1.50	1.37

ECA TASK SCORE<sub>DESCRIPTION</sub> = 7.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 57.0

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 23.3

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0		X			25	13
NOT PROBLEM	X	X	X	X	100	X		X	X	75	88

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = OPERATE ITV SQUAD LEADERS PERISCOPE  
(071-316-2537)

PP = 2

TT = 1.57

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 22.62

OPERATE THE SQUAD LEADER'S PERISCOPE ON AN M901 VEHICLE

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	1	1	1	1.00
TLD	1	1	1	1	1	1.00
TT	1	1	1	1	1	1.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	3	1	1	1	1	1.40	1.20
TLD	2	1	1	1	1	1.20	1.10
TT	1	1	1	1	1	1.00	1.00

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	1	1	1	1	1.00	1.13
TLD	1	1	1	1	1	1.00	1.07
TT	1	1	1	2	1	1.20	1.07

ECA TASK SCORE DESCRIPTION = 1.3

ECA TASK SCORE NO DESCRIPTION = 1.2

ECA TASK SCORE OVERALL (OSUT) = 1.3

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

ENGAGE A TARGET

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	3	4	3.50	4	3	3.50	3.50
TPD	3	1	2.00	2	3	2.50	2.25
FR	3	3	3.00	3	2	2.50	2.75
TLD	2	1	1.50	2	2	2.00	1.75
TT	1	2	1.50	2	2	2.00	1.75
DR	2	2	2.00	1	3	2.00	2.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 94.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 175.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 132.6

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM	X		1	50	X		1	50	2	50
NOT PROBLEM		X	1	50		X	1	50	2	50

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = ENGAGE TARGETS WITH ITV DUAL LAUNCHER  
(071-316-2531)

PP = 2

TT = 2.05

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 113.15

# ENGAGE A TARGET

## INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	2	4	1	4	2.75	4	4	4	3	3.75	3.25
TPD	1	1	1	2	1.25	3	3	1	1	2.00	1.62
FR	2	2	3	1	2.00	3	2	3	5	2.67	2.29
TLD	1	1	1	1	1.00	3	2	2	1	2.25	1.62
TT	1	1	1	1	1.00	3	1	1	1	1.75	1.37
DR	1	1	1	2	1.25	3	2	1	1	1.75	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 8.6

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 137.8

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 40.5

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

## ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = ENGAGE TARGETS WITH ITV DUAL LAUNCHER  
(071-316-3531)

PP = 2

TT = 2.05

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 40.54

ENGAGE A TARGET

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	2	1	1	1.20
TLD	1	1	2	1	1	1.20
TT	1	1	2	1	1	1.20

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	1	1	1	1	1	1.00	1.10
TLD	1	1	1	1	1	1.00	1.10
TT	1	1	1	1	1	1.00	1.10

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	1	1	1	1	1.00	1.07
TLD	1	1	1	1	1	1.00	1.07
TT	1	1	1	3	1	1.40	1.20

ECA TASK SCORE DESCRIPTION = 1.3

ECA TASK SCORE NO DESCRIPTION = 1.4

ECA TASK SCORE OVERALL (OSUT) = 1.5

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM		X				1	20	7
NO PROBLEM	X		X	X	X	4	80	93

RELOAD TOW LAUNCHER (ITV)

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	2	4	3.00	4	3	3.50	3.25
TPD	4	1	2.50	1	4	2.50	2.50
FR	2	3	2.50	3	2	2.50	2.50
TLD	2	1	1.50	1	3	2.00	1.75
TT	1	1	1.00	2	1	1.50	1.25
DR	1	1	1.00	1	2	1.50	1.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 28.1

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 98.4

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 55.5

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM	X		1	50		X	1	50	2	50
NOT PROBLEM		X	1	50	X		1	50	2	50

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = RELOAD ITV DUAL LAUNCHER  
(071-316-2533)

PP = 2

TT = 2.01

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 58.61

RELOAD TOW LAUNCHER (ITV)

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	2	4	1	4	2.75	4	2	4	3	3.25	3.00
TPD	3	1	1	2	1.75	3	3	2	1	2.25	2.00
FR	2	2	3	3	2.50	5	2	3	5	2.50	2.50
TLD	1	1	1	3	1.50	4	3	2	1	2.75	2.12
TT	1	1	1	2	1.25	3	1	1	1	1.75	1.50
DR	2	2	1	2	1.75	3	3	2	5	2.33	2.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 39.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 205.3

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 95.6

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = RELOAD ITV DUAL LAUNCHER  
(071-316-2533)

PP = 2

TT = 2.01

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 93.28

RELOAD TOW LAUNCHER (ITV)

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	3	1	2	1	1	1.60
TLD	1	1	1	1	1	1.00
TT	2	1	1	2	1	1.40

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	1	1	1	3	2	1.60	1.60
TLD	1	1	1	1	1	1.00	1.00
TT	1	2	1	1	2	1.40	1.40

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	2	2	2	2	2	2.00	1.73
TLD	1	1	1	2	1	1.20	1.07
TT	1	2	1	3	1	1.60	1.47

ECA TASK SCORE<sub>DESCRIPTION</sub> = 2.2

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 3.8

ECA TASK SCORE<sub>OVERALL (OSUT)</sub> = 2.7

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM				X		1	20	10
NO PROBLEM	X	X	X		X	4	80	90

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	7
NO PROBLEM	X	X	X	X	X	5	100	93



PERFORM MISFIRE/HANGFIRE PROCEDURES (ITV)

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	2	4	3.00	4	3	3.50	3.25
TPD	1	3	2.00	2	2	2.00	2.00
FR	2	3	2.50	3	2	2.50	2.50
TLD	1	3	2.00	2	2	2.00	2.00
TT	1	2	1.50	2	1	1.50	1.50
DR	1	4	2.50	1	2	1.50	2.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 112.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 78.8

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 97.5

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM			0	0	X		1	50	1	25
NOT PROBLEM	X	X	2	100		X	1	50	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

PERFORM MISFIRE/HANGFIRE PROCEDURES (ITV)

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	2	2.75	4	1	2	1	2.00	2.37
TPD	3	1	2	2	2.00	3	2	3	1	2.25	2.12
FR	1	1	3	3	2.00	4	1	3	5	2.67	2.29
TLD	1	1	2	3	1.75	3	3	3	1	2.50	2.12
TT	1	1	1	2	1.25	2	1	2	1	1.75	1.50
DR	2	2	2	2	2.00	3	4	2	5	3.00	2.43

ECA TASK SCORE<sub>DESCRIPTION</sub> = 48.1

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 157.5

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 89.3

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	% %	
PROBLEM					0			X		25	13	
NOT PROBLEM	X	X	X	X	100	X	X		X	75	88	

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

# PERFORM MISFIRE/HANGFIRE PROCEDURES (ITV)

## UNIT TRAINING (OSUT) SOLDIERS

OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
1	1	1	1	1	1.00
1	1	1	2	1	1.20
1	1	1	1	1	1.00

OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
1	1	1	1	1	1.00	1.00
1	1	1	1	1	1.00	1.10
1	2	1	1	1	1.20	1.10

OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
1	1	1	1	1	1.00	1.00
1	1	1	1	1	1.00	1.07
1	1	1	2	1	1.20	1.13

TPD  
TLD  
TT

ECA TASK SCORE DESCRIPTION = 1.2  
 ECA TASK SCORE NO DESCRIPTION = 1.2  
 ECA TASK SCORE OVERALL (OSUT) = 1.2

PROBLEM	OSUT1	OSUT2	OSUT3	GROUP FD OSUT4	OSUT5	TOTAL	%
NO PROBLEM	X	X	X	X	X	5	100
PROBLEM						0	0

PROBLEM	OSUT1	OSUT2	OSUT3	GROUP EFD OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
NO PROBLEM	X	X	X	X	X	5	100	100
PROBLEM						0	0	0

PROBLEM	OSUT1	OSUT2	OSUT3	GROUP EFND OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
NO PROBLEM	X	X	X	X	X	5	100	100
PROBLEM						0	0	0

PERFORM EMERGENCY ACTION PROCEDURES (ITV)

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			
	SL 1	SL 2	AVERAGE	SL 3	OVERALL SL 4	AVERAGE	AVERAGE
PP	2	4	3.00	4	2	3.00	3.00
TPD	3	3	3.00	1	3	2.00	2.50
FR	2	3	2.50	3	2	2.50	2.50
TLD	1	1	1.00	1	3	2.00	1.50
TT	1	2	1.50	1	1	1.00	1.25
DR	1	2	1.50	1	2	1.50	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 50.6

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 45.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 52.7

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM	X		1	50			0	0	1	25
NOT PROBLEM		X	1	50	X	X	2	100	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = OPERATE ITV DUAL LAUNCHER USING EMERGENCY PROCEDURES  
(071-316-2536)

PP = 2

TT = 2.79

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 71.02

PERFORM EMERGENCY ACTION PROCEDURES (ITV)

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	4	3.25	2	1	3	2	2.00	2.62
TPD	3	1	1	1	1.50	2	4	1	1	2.00	1.75
FR	1	1	3	2	1.75	3	1	3	5	2.33	2.00
TLD	1	1	1	1	1.00	2	2	1	1	2.00	1.50
TT	1	1	1	2	1.25	2	1	1	1	1.25	1.25
DR	2	2	1	1	1.50	2	3	1	1	1.75	1.62

ECA TASK SCORE<sub>DESCRIPTION</sub> = 16.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 40.8

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 28.0

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	%	%
PROBLEM					0		X			25		13
NOT PROBLEM	X	X	X	X	100	X		X	X	75		88

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = OPERATE ITV DUAL LAUNCHER USING EMERGENCY PROCEDURES  
(071-316-2536)

PP = 2

TT = 2.79

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 39.69

PERFORM EMERGENCY ACTION PROCEDURES (ITV)

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	3	1	1	1	1	1.40
TLD	1	1	1	1	1	1.00
TT	2	1	1	1	2	1.40

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	1	1	2	3	3	2.00	1.70
TLD	1	1	1	1	2	1.20	1.10
TT	1	2	1	1	3	1.60	1.50

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	1	1	2	3	1.60	1.67
TLD	1	1	1	2	1	1.20	1.16
TT	1	1	1	3	1	1.40	1.47

ECA TASK SCORE DESCRIPTION = 2.8

ECA TASK SCORE NO DESCRIPTION = 2.7

ECA TASK SCORE OVERALL (OSUT) = 2.8

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM		X		X		2	40
NO PROBLEM	X		X		X	3	60

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	20
NO PROBLEM	X	X	X	X	X	5	100	80

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	13
NO PROBLEM	X	X	X	X	X	5	100	87

OPERATE INTERCOMMUNICATIONS SET AN/VIC-1 ON A TRACKED VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	4	4	4.00	4	4	4.00	4.00
TPD	1	1	1.00	1	2	1.50	1.25
FR	4	4	4.00	3	4	3.50	3.75
TLD	1	1	1.00	1	2	1.50	1.25
TT	1	1	1.00	1	1	1.00	1.00
DR	1	1	1.00	1	2	1.50	1.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 16.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 47.3

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 29.3

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

OPERATE INTERCOMMUNICATIONS SET AN/VIC-1 ON A TRACKED VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	1	2.50	4	2	4	1	2.75	2.62
TPD	1	1	1	2	1.25	1	2	1	1	1.25	1.25
FR	1	1	3	1	1.50	3	1	1	5	1.67	1.57
TLD	1	1	1	2	1.25	2	3	1	1	1.75	1.50
TT	1	1	1	2	1.25	2	2	1	1	1.50	1.37
DR	1	1	1	2	1.25	2	3	1	3	2.25	1.75

ECA TASK SCORE<sub>DESCRIPTION</sub> = 9.2

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 33.8

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 18.6

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	%	%
PROBLEM					0					0		0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100		100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.



OPERATE INTERCOMMUNICATIONS SET AN/VIC-1 ON A TRACKED VEHICLE

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	5	1	2	5	1	1.33
TLD	5	1	2	5	1	1.33
TT	5	1	1	5	1	1.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	5	5	5	5	5	N/A	1.33
TLD	5	5	5	5	5	N/A	1.33
TT	5	5	5	5	5	N/A	1.00

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	5	5	5	2	3	2.50	1.80
TLD	5	5	5	2	5	2.00	1.50
TT	5	5	5	3	5	3.00	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 1.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 15.0

ECA TASK SCORE<sub>OVERALL (OSUT)</sub> = 4.1

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM			X		X	2	100	29
NO PROBLEM						0	0	71

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	20
NO PROBLEM	X		X	X		3	100	80

SEND A RADIO MESSAGE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	4	4	4.00	4	3	3.50	3.75
TPD	1	3	2.00	1	3	2.00	2.00
FR	4	4	4.00	4	4	4.00	4.00
TLD	1	3	2.00	1	2	1.50	1.75
TT	1	2	1.50	1	1	1.00	1.25
DR	1	2	1.50	1	3	2.00	1.75

ECA TASK SCORE<sub>DESCRIPTION</sub> = 144.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 84.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 114.8

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = TRANSMIT / RECEIVE RADIO MESSAGES

PP = 3

TT = 2.28

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 146.57

# SEND A RADIO MESSAGE

## INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	1	2	1	1	1.25	3	2	4	1	2.50	1.87
TPD	1	1	1	1	1.00	1	1	1	1	1.00	1.00
FR	3	4	3	5	3.33	4	2	1	5	2.33	2.83
TLD	1	1	1	1	1.00	2	2	1	1	1.50	1.25
TT	1	1	1	1	1.00	2	1	1	1	1.25	1.12
DR	2	2	1	5	1.67	3	2	1	2	2.00	1.86

ECA TASK SCORE DESCRIPTION = 6.9

ECA TASK SCORE NO DESCRIPTION = 21.9

ECA TASK SCORE OVERALL (IN) = 13.9

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	%	%
PROBLEM					0					0		0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100		100

## ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = TRANSMIT / RECEIVE RADIO MESSAGES

PP = 3

TT = 2.28

ECA TASK SCORE OVERALL (UNIT + AOSP DATA) = 27.29

SEND A RADIO MESSAGE

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	1	2	1	1.20
TLD	1	1	1	2	1	1.20
TT	2	1	1	3	1	1.60

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	5	5	5	5	1	1.00	1.17
TLD	5	5	5	5	1	1.00	1.17
TT	5	5	5	5	1	1.00	1.50

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	5	1	1	1	1.00	1.10
TLD	1	5	1	1	1	1.00	1.10
TT	2	5	1	2	1	1.50	1.50

ECA TASK SCORE DESCRIPTION = 2.1

ECA TASK SCORE NO DESCRIPTION = 1.5

ECA TASK SCORE OVERALL (OSUT) = 1.8

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X		X	4	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM			X			1	50	17
NO PROBLEM					X	1	50	83

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	10
NO PROBLEM	X		X	X	X	4	100	90

PREPARE RADIO SET AN/VRC-64 OR AN/GRC-160 FOR OPERATION

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			
	SL 1	SL 2	AVERAGE	SL 3	OVERALL SL 4	AVERAGE	AVERAGE
PP	-	4	4.00	4	3	3.50	3.67
TPD	-	2	2.00	1	2	1.50	1.67
FR	-	4	4.00	4	4	4.00	4.00
TLD	-	2	2.00	1	2	1.50	1.67
TT	-	1	1.00	1	1	1.00	1.00
DR	-	1	1.00	1	3	2.00	1.67

NOTE: SL 1 did not complete task rating.

ECA TASK SCORE DESCRIPTION = 64.0

ECA TASK SCORE NO DESCRIPTION = 63.0

ECA TASK SCORE OVERALL (UNIT) = 68.3

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

PREPARE RADIO SET AN/VRC-64 OR AN/GRC-160 FOR OPERATION

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	3	3	1	1	2.00	4	1	4	1	2.50	2.25
TPD	1	1	1	2	1.25	1	3	1	1	1.50	1.37
FR	2	2	3	1	2.00	3	3	1	5	2.33	2.14
TLD	1	1	1	2	1.25	2	2	1	1	1.50	1.37
TT	1	1	1	2	1.25	1	1	1	1	1.00	1.12
DR	2	2	1	5	1.67	3	3	1	1	2.00	1.86

ECA TASK SCORE DESCRIPTION = 13.0

ECA TASK SCORE NO DESCRIPTION = 26.3

ECA TASK SCORE OVERALL (IN) = 19.0

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

PREPARE RADIO SET AN/PRC-77 OR AN/PRC-25 FOR OPERATION

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	1	5	1	1.00
TLD	1	1	1	5	1	1.00
TT	1	1	1	5	1	1.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	5	1	5	5	5	1.00	1.00
TLD	5	1	5	5	5	1.00	1.00
TT	5	4	5	5	5	4.00	1.60

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	5	1	1	1	1.00	1.00
TLD	1	5	1	1	1	1.00	1.00
TT	1	5	1	3	1	1.50	1.56

ECA TASK SCORE DESCRIPTION = 1.6

ECA TASK SCORE NO DESCRIPTION = 1.5

ECA TASK SCORE OVERALL (OSUT) = 1.6

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X		X	4	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM			X		X	2	100	33
NO PROBLEM						0	0	67

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	20
NO PROBLEM	X		X	X	X	4	100	80

PREPARE RADIO SET AN/PRC-77 OR AN/PRC-25 FOR OPERATION

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	3	4	3.50	4	3	3.50	3.50
TPD	1	2	1.50	1	2	1.50	1.50
FR	3	3	3.00	3	4	3.50	3.25
TLD	1	2	1.50	1	2	1.50	1.50
TT	1	1	1.00	1	1	1.00	1.00
DR	1	2	1.50	1	3	2.00	1.75

ECA TASK SCORE<sub>DESCRIPTION</sub> = 35.4

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 55.1

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 44.8

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.



PREPARE RADIO SET AN/PRC-77 OR AN/PRC-25 FOR OPERATION

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	3	4	1	2	2.50	4	2	3	1	2.50	2.50
TPD	1	1	1	1	1.00	1	3	1	1	1.50	1.25
FR	1	1	3	2	1.75	3	2	1	5	2.00	1.86
TLD	1	1	1	1	1.00	2	1	1	1	1.25	1.12
TT	1	1	1	2	1.25	1	1	1	1	1.00	1.12
DR	2	2	1	2	1.75	3	2	1	2	2.00	1.87

ECA TASK SCORE DESCRIPTION = 9.6

ECA TASK SCORE NO DESCRIPTION = 18.8

ECA TASK SCORE OVERALL (IN) = 13.8

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE TURRET ON AN M901 VEHICLE

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	2	1	1	1.20
TLD	1	1	2	2	2	1.60
TT	2	1	2	2	2	1.80

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	4	2	1	1	1	1.80	1.50
TLD	4	2	1	1	1	1.80	1.70
TT	2	4	1	1	4	2.40	2.10

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	2	5	1	2	5	1.67	1.38
TLD	2	5	1	2	5	1.67	1.69
TT	3	5	1	3	5	2.33	2.15

ECA TASK SCORE DESCRIPTION = 5.4

ECA TASK SCORE NO DESCRIPTION = 6.5

ECA TASK SCORE OVERALL (OSUT) = 5.0

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM	X					1	25	7
NO PROBLEM			X	X	X	3	75	93

OPERATE RADIO SET AN/VRC-64 OR AN/GRC-160

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	4	4	4.00	4	3	3.50	3.75
TPD	1	1	1.00	1	2	1.50	1.25
FR	4	4	4.00	1	4	2.50	3.25
TLD	1	1	1.00	1	2	1.50	1.25
TT	1	1	1.00	1	1	1.00	1.00
DR	1	1	1.00	1	3	2.00	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 16.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 13.1

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 28.6

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

OPERATE RADIO SET AN/VRC-64 OR AN/GRC-160

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	2	1	1	2	1.50	4	2	4	1	2.75	2.12
TPD	2	1	1	1	1.25	2	2	1	1	1.50	1.37
FR	1	1	4	2	2.00	3	3	2	5	2.67	2.29
TLD	2	2	1	1	1.50	2	3	1	1	2.00	1.75
TT	1	1	1	2	1.25	1	2	1	1	1.25	1.25
DR	2	2	1	2	1.75	2	3	1	2	2.00	1.87

ECA TASK SCORE<sub>DESCRIPTION</sub> = 12.3

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 55.0

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 27.4

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	%	%
PROBLEM					0					0		0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100		100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

PERFORM OPERATOR'S PMCS ON AN/VRC-12 SERIES RADIO

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	SL 1	SL 2	AVERAGE	SL 3	SL 4	AVERAGE	
PP	1	5	1.00	2	5	2.00	1.50
TPD	1	5	1.00	1	5	1.00	1.00
FR	2	5	2.00	1	5	1.00	1.50
TLD	2	5	2.00	2	5	2.00	2.00
TT	1	5	1.00	1	5	1.00	1.00
DR	3	5	3.00	2	5	2.00	2.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 12.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 8.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 11.3

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	SL 1	SL 2	TOTAL	%	SL 3	SL 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X		1	100	3	100

NOTE: SL 4 had no opinion.

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

PERFORM OPERATOR'S PMCS ON AN/VRC-12 SERIES RADIO

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	5	5	1	1	1.00	5	1	2	1	1.33	1.20
TPD	5	5	1	2	1.50	5	2	1	1	1.33	1.40
FR	5	5	4	1	2.50	5	2	3	5	2.50	2.50
TLD	5	5	1	1	1.00	5	2	1	1	2.00	1.60
TT	5	5	1	2	1.50	5	2	1	1	1.33	1.40
DR	5	5	1	2	1.50	5	4	1	2	2.33	2.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 8.4

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 27.7

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 18.8

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	% %	
PROBLEM				X	25					0	13	
NOT PROBLEM	X	X	X		75	X	X	X	X	100	88	

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE TURRET ON AN M901 VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	G 1	G 2	AVERAGE	G 3	G 4	AVERAGE	
PP	1	4	2.50	1	4	2.50	2.50
TPD	2	2	2.00	1	2	1.50	1.75
FR	3	4	3.50	3	4	3.50	3.50
TLD	2	2	2.00	1	2	1.50	1.75
TT	2	2	2.00	2	4	3.00	2.50
DR	2	3	2.50	2	2	2.00	2.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 175.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 118.1

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 150.7

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	G 1	G 2	TOTAL	%	G 3	G 4	TOTAL	%		
PROBLEM			0	0	X		1	50	1	25
NOT PROBLEM	X	X	2	100		X	1	50	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE TURRET ON AN M901 VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	2	1	2.75	4	3	4	1	3.00	2.87
TPD	2	1	2	2	1.75	1	3	3	1	2.00	1.87
FR	2	2	4	2	2.50	4	3	4	5	3.67	3.00
TLD	2	1	2	2	1.75	2	3	2	1	2.50	2.12
TT	3	3	2	3	2.75	1	2	3	1	1.50	2.12
DR	2	2	2	2	2.00	3	2	2	2	2.50	2.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 115.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 206.3

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 164.3

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	% %	
PROBLEM					0				X	25	13	
NOT PROBLEM	X	X	X	X	100	X	X	X		75	88	

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.



OPERATE THE TURRET ON AN M901 VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	G 1	G 2	AVERAGE	G 3	G 4	AVERAGE	
PP	2	4	3.00	1	4	2.50	2.75
TPD	1	1	1.00	1	3	2.00	1.50
FR	3	3	3.00	3	4	3.50	3.25
TLD	2	1	1.50	1	2	1.50	1.50
TT	2	1	1.50	1	4	2.50	2.00
DR	2	1	1.50	2	2	2.00	1.75

ECA TASK SCORE<sub>DESCRIPTION</sub> = 30.4

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 131.3

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 70.4

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	G 1	G 2	TOTAL	%	G 3	G 4	TOTAL	%		
PROBLEM			0	0		X	1	50	1	25
NOT PROBLEM	X	X	2	100	X		1	50	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

OPERATE THE TURRET ON AN M901 VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	4	3.25	4	3	4	1	3.00	3.12
TPD	2	2	1	3	2.00	2	3	3	1	2.25	2.12
FR	2	2	4	3	2.75	4	3	4	5	3.67	3.14
TLD	2	2	1	3	2.00	2	3	3	1	2.50	2.25
TT	3	4	1	4	3.00	2	4	4	1	2.50	2.75
DR	2	2	1	4	2.25	3	4	3	2	3.25	2.75

ECA TASK SCORE<sub>DESCRIPTION</sub> = 241.3

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 502.7

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 355.1

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

OPERATE THE TURRET ON AN M901 VEHICLE

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	3	1	1	1.40
TLD	2	1	3	2	1	1.80
TT	3	1	2	2	1	1.80

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	4	2	3	1	1	2.20	1.80
TLD	4	2	3	1	1	2.20	2.00
TT	2	4	2	1	1	2.00	1.90

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	3	2	2	1	1.80	1.80
TLD	2	3	1	2	2	2.00	2.00
TT	2	3	1	3	1	2.00	1.93

ECA TASK SCORE<sub>DESCRIPTION</sub> = 6.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 7.2

ECA TASK SCORE<sub>OVERALL (OSUT)</sub> = 6.9

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

MOUNT AN M60 MACHINEGUN ON A VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	G 1	G 2	AVERAGE	G 3	G 4	AVERAGE	
PP	2	5	2.00	4	4	4.00	3.33
TPD	2	1	1.50	1	1	1.00	1.25
FR	2	3	2.50	3	3	3.00	2.75
TLD	1	1	1.00	1	1	1.00	1.00
TT	1	1	1.00	1	1	1.00	1.00
DR	1	1	1.00	1	1	1.00	1.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 7.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 12.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 11.5

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	G 1	G 2	TOTAL	%	G 3	G 4	TOTAL	%		
PROBLEM		X	1	50			0	0	1	25
NOT PROBLEM	X		1	50	X	X	2	100	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MOUNT AN M60 MACHINEGUN ON A VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	4	3.25	4	2	4	1	2.75	3.00
TPD	1	1	1	1	1.00	1	1	1	1	1.00	1.00
FR	1	1	3	2	1.75	3	1	3	5	2.33	2.00
TLD	1	1	1	1	1.00	1	1	1	1	1.50	1.25
TT	1	1	1	1	1.00	1	1	1	1	1.00	1.00
DR	1	1	1	1	1.00	3	2	1	2	2.00	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 5.7

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 19.3

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 11.3

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MOUNT AN M60 MACHINEGUN ON A VEHICLE

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	1	1	1	1.00
TLD	1	1	1	1	1	1.00
TT	1	1	1	1	1	1.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	1	1	1	1	1	1.00	1.00
TLD	1	1	1	1	1	1.00	1.00
TT	1	4	1	1	1	1.60	1.30

	OSUT1	OSUT2	GROUP EFMD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFMD AVERAGE
TPD	1	1	1	1	1	1.00	1.00
TLD	1	1	1	1	1	1.00	1.00
TT	1	1	1	1	1	1.00	1.20

ECA TASK SCORE DESCRIPTION = 1.3

ECA TASK SCORE NO DESCRIPTION = 1.0

ECA TASK SCORE OVERALL (OSUT) = 1.2

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

	OSUT1	OSUT2	GROUP EFMD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFMD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

DISMOUNT AN M60 MACHINEGUN FROM A VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	G 1	G 2	AVERAGE	G 3	G 4	AVERAGE	
PP	2	4	3.00	4	3	3.50	3.25
TPD	2	1	1.50	1	1	1.00	1.25
FR	2	3	2.50	3	3	3.00	2.75
TLD	1	1	1.00	1	1	1.00	1.00
TT	1	1	1.00	1	1	1.00	1.00
DR	1	1	1.00	1	1	1.00	1.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 11.3

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 10.5

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 11.2

	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	G 1	G 2	TOTAL	%	G 3	G 4	TOTAL	%		
PROBLEM		X	1	50			0	0	1	25
NOT PROBLEM	X		1	50	X	X	2	100	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (ADSP) DATA: None available.

DISMOUNT AN M60 MACHINEGUN FROM A VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	4	3.25	4	2	4	1	2.75	3.00
TPD	1	1	1	1	1.00	1	1	1	1	1.00	1.00
FR	1	1	3	2	1.75	3	1	4	5	2.67	2.14
TLD	1	1	1	1	1.00	1	1	1	1	1.75	1.37
TT	1	1	1	1	1.00	1	1	1	1	1.00	1.00
DR	1	1	1	1	1.00	3	2	1	1	1.75	1.37

ECA TASK SCORE DESCRIPTION = 5.7

ECA TASK SCORE NO DESCRIPTION = 22.5

ECA TASK SCORE OVERALL (IN) = 12.2

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.



DISMOUNT AN M60 MACHINEGUN FROM A VEHICLE

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	1	1	1	1.00
TLD	1	1	1	1	1	1.00
TT	1	1	1	1	1	1.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	1	1	1	1	1	1.00	1.00
TLD	1	1	1	1	1	1.00	1.00
TT	1	1	1	1	1	1.00	1.00

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	1	1	1	1	1.00	1.00
TLD	1	1	1	1	1	1.00	1.00
TT	1	1	1	1	1	1.00	1.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 1.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 1.0

ECA TASK SCORE<sub>OVERALL (OSUT)</sub> = 1.0

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

MAINTAIN AN M220 LAUNCHER SYSTEM

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	G 1	G 2	AVERAGE	G 3	G 4	AVERAGE	
PP	1	4	2.50	2	4	3.00	2.75
TPD	1	1	1.00	2	2	2.00	1.50
FR	4	4	4.00	4	4	4.00	4.00
TLD	1	2	1.50	1	1	1.00	1.25
TT	2	2	2.00	1	2	1.50	1.75
DR	1	1	1.00	2	1	1.50	1.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 30.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 54.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 45.1

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	G 1	G 2	TOTAL	%	G 3	G 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN AN M220 LAUNCHER SYSTEM

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	2	2	3.00	4	3	4	1	3.00	3.00
TPD	1	1	1	2	1.25	1	2	1	1	1.25	1.25
FR	3	4	4	2	3.25	3	3	4	5	3.33	3.29
TLD	1	1	1	2	1.25	1	3	1	1	2.25	1.75
TT	1	1	1	1	1.00	1	2	1	1	1.25	1.12
DR	2	2	1	2	1.75	3	3	1	2	2.25	2.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 26.7

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 79.1

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 48.5

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	%	
PROBLEM					0					0	0	
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100	

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

# MAINTAIN AN M220 LAUNCHER SYSTEM

## ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	2	2	1	1.40
TLD	2	1	2	2	1	1.60
TT	5	1	2	2	1	1.50

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	2	5	1	1	5	1.33	1.38
TLD	2	5	1	1	5	1.33	1.50
TT	1	5	1	1	5	1.00	1.29

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	2	5	1	1	1	1.67	1.33
TLD	2	5	1	1	1	1.67	1.42
TT	3	5	1	1	1	1.50	1.36

ECA TASK SCORE DESCRIPTION = 2.7

ECA TASK SCORE NO DESCRIPTION = 4.2

ECA TASK SCORE OVERALL (OSUT) = 2.6

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM			X			1	20
NO PROBLEM	X	X		X	X	4	80

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	10
NO PROBLEM	X	X	X	X	X	5	100	90

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	7
NO PROBLEM	X		X	X	X	4	100	93

PERFORM A PREOPERATIONAL INSPECTION OF AN M220 LAUNCHER SYSTEM  
AND ENCASED MISSILE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	G 1	G 2	AVERAGE	G 3	G 4	AVERAGE	
PP	1	4	2.50	2	4	3.00	2.75
TPD	1	2	1.50	1	2	1.50	1.50
FR	4	3	3.50	4	4	4.00	3.75
TLD	1	2	1.50	1	2	1.50	1.50
TT	2	2	2.00	1	2	1.50	1.75
DR	1	2	1.50	1	1	1.00	1.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 59.1

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 40.5

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 50.8

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	G 1	G 2	TOTAL	%	G 3	G 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = CONDUCT SYSTEM SELF TEST / PREOPERATION INSPECTION OF TOW LAUNCHER / ENCASED MISSILE  
(071-316-2502)

PP = 4

TT = 1.42

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 56.68

PERFORM A PREOPERATIONAL INSPECTION OF AN M220 LAUNCHER SYSTEM AND ENCASED MISSILE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	4	3.25	4	2	4	1	2.75	3.00
TPD	1	1	1	1	1.00	1	3	1	1	1.50	1.25
FR	1	1	4	2	2.00	4	3	4	5	3.67	2.71
TLD	1	1	1	2	1.25	1	2	1	1	2.00	1.62
TT	1	1	1	2	1.25	1	2	1	1	1.25	1.25
DR	2	2	1	2	1.75	3	3	1	2	2.25	2.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 17.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 85.1

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 41.4

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = CONDUCT SYSTEM SELF TEST / PREOPERATION INSPECTION OF TOW LAUNCHER / ENCASED MISSILE  
(071-316-2502)

PP = 4

TT = 1.42

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 51.48

PERFORM A PREOPERATIONAL INSPECTION OF AN  
M220 LAUNCHER SYSTEM AND ENCASED MISSILE

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	2	2	1	1.40
TLD	1	1	2	2	1	1.40
TT	1	1	1	2	1	1.20

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	3	1	1	1	1	1.40	1.40
TLD	4	1	1	1	1	1.60	1.50
TT	2	4	1	1	1	1.80	1.50

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	5	1	2	2	1	1.50	1.43
TLD	5	1	1	1	1	1.00	1.36
TT	5	1	1	2	1	1.25	1.43

ECA TASK SCORE DESCRIPTION = 3.2

ECA TASK SCORE NO DESCRIPTION = 1.9

ECA TASK SCORE OVERALL (OSUT) = 2.8

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM	X					1	20	10
NO PROBLEM		X	X	X	X	4	80	90

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	7
NO PROBLEM	X	X	X	X	X	5	100	93

# ENGAGE TARGETS WITH AN M220 LAUNCHER SYSTEM

## TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	G 1	G 2	AVERAGE	G 3	G 4	AVERAGE	
PP	1	4	2.50	2	4	3.00	2.75
TPD	3	1	2.00	1	3	2.00	2.00
FR	1	2	1.50	3	3	3.00	2.25
TLD	2	1	1.50	1	2	1.50	1.50
TT	2	1	1.50	2	3	2.50	2.00
DR	3	1	2.00	1	1	1.00	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 33.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 67.5

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 55.7

	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	G 1	G 2	TOTAL	%	G 3	G 4	TOTAL	%		
PROBLEM	X		1	50		X	1	50	2	50
NOT PROBLEM		X	1	50	X		1	50	2	50

## ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = ENGAGE TARGET WITH TOW  
(071-316-2519)

PP = 4

TT = 1.77

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 64.68



# ENGAGE TARGETS WITH AN M220 LAUNCHER SYSTEM

## INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	2	3	3.25	3	3	4	2	3.00	3.12
TPD	2	1	2	1	1.50	1	2	1	1	1.25	1.37
FR	1	1	3	2	1.75	3	2	3	5	2.67	2.14
TLD	1	1	1	2	1.25	2	2	2	1	2.00	1.62
TT	1	1	1	2	1.25	2	1	2	1	1.50	1.37
DR	1	1	1	2	1.25	3	2	1	2	2.25	1.75

ECA TASK SCORE DESCRIPTION = 16.7

ECA TASK SCORE NO DESCRIPTION = 67.5

ECA TASK SCORE OVERALL (IN) = 36.0

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

## ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = ENGAGE TARGETS WITH TOW  
(071-316-2519)

PP = 4

TT = 1.77

ECA TASK SCORE OVERALL (UNIT + AOSP DATA) = 46.46

# ENGAGE TARGETS WITH AN M220 LAUNCHER SYSTEM

## ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	4	1	3	1	1	2.00
TLD	1	1	3	1	1	1.40
TT	2	1	3	1	2	1.80

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	1	1	1	2	2	1.40	1.70
TLD	1	1	1	1	1	1.00	1.20
TT	1	1	1	2	3	1.60	1.70

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	1	2	1	1	1.20	1.53
TLD	1	1	1	1	1	1.00	1.13
TT	2	1	1	2	1	1.40	1.40

ECA TASK SCORE DESCRIPTION = 3.5

ECA TASK SCORE NO DESCRIPTION = 1.7

ECA TASK SCORE OVERALL (OSUT) = 2.4

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

ENGAGE TARGETS WITH AN M220 LAUNCHER SYSTEM  
WHILE MOUNTED ON AN M901 VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	G 1	G 2	AVERAGE	G 3	G 4	AVERAGE	
PP	1	4	2.50	2	4	3.00	2.75
TPD	4	1	2.50	1	2	1.50	2.00
FR	2	1	1.50	3	3	3.00	2.25
TLD	2	1	1.50	1	2	1.50	1.50
TT	4	1	2.50	2	3	2.50	2.50
DR	4	1	2.50	1	1	1.00	1.75

ECA TASK SCORE<sub>DESCRIPTION</sub> = 87.9

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 75.9

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 81.2

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	G 1	G 2	TOTAL	%	G 3	G 4	TOTAL	%		
PROBLEM	X		1	50		X	1	50	2	50
NOT PROBLEM		X	1	50	X		1	50	2	50

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = ENGAGE TARGETS WITH ITV DUAL LAUNCHER  
 (071-316-253)

PP = 2

TT = 2.05

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 64.10

ENGAGE TARGETS WITH AN M220 LAUNCHER SYSTEM WHILE MOUNTED ON AN M901 VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	2	2.75	3	2	4	2	2.75	2.75
TPD	1	1	2	2	1.50	2	3	1	1	1.75	1.62
FR	1	1	3	2	1.75	3	2	3	5	2.67	2.14
TLD	1	1	1	2	1.25	1	3	1	1	2.00	1.62
TT	1	1	1	2	1.25	1	2	2	1	1.25	1.25
DR	5	5	1	2	1.50	2	3	1	2	2.25	2.00

ECA TASK SCORE DESCRIPTION = 16.9

ECA TASK SCORE NO DESCRIPTION = 72.2

ECA TASK SCORE OVERALL (IN) = 38.9

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = ENGAGE TARGETS WITH ITV DUAL LAUNCHER  
(071-316-253)

PP = 2

TT = 2.05

ECA TASK SCORE OVERALL (UNIT + AOSP DATA) = 44.11

ENGAGE TARGETS WITH AN M220 LAUNCHER  
SYSTEM WHILE MOUNTED ON AN M901 VEHICLE

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	4	1	3	1	1	2.00
TLD	1	1	3	1	1	1.40
TT	2	1	3	1	1	1.60

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	2	1	1	2	1	1.40	1.70
TLD	2	1	1	1	1	1.20	1.30
TT	1	1	1	2	1	1.20	1.40

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	5	1	2	1	1.25	1.57
TLD	1	5	1	2	1	1.25	1.29
TT	1	5	1	2	1	1.25	1.36

ECA TASK SCORE<sub>DESCRIPTION</sub> = 3.1

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 2.0

ECA TASK SCORE<sub>OVERALL (OSUT)</sub> = 2.8

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM	X					1	20
NO PROBLEM		X	X	X	X	4	80

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM				X		1	20	20
NO PROBLEM	X	X	X		X	4	80	80

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	13
NO PROBLEM	X	X	X	X	X	5	100	87

PERFORM IMMEDIATE ACTION FOR AN M220 LAUNCHER SYSTEM MISFIRE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	G 1	G 2	AVERAGE	G 3	G 4	AVERAGE	
PP	2	4	3.00	3	4	3.50	3.25
TPD	1	1	1.00	1	1	1.00	1.00
FR	2	2	2.00	2	3	2.50	2.25
TLD	1	1	1.00	1	2	1.50	1.25
TT	1	1	1.00	1	1	1.00	1.00
DR	1	1	1.00	2	1	1.50	1.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 6.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 19.7

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 11.4

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	G 1	G 2	TOTAL	%	G 3	G 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = PERFORM IMMEDIATE ACTION FOR TOW MISFIRE  
(071-316-2504)

PP = 4

TT = 1.91

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 18.63

PERFORM IMMEDIATE ACTION FOR AN M220 LAUNCHER SYSTEM MISFIRE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	2	5	3.33	3	1	4	1	2.25	2.71
TPD	1	1	1	1	1.00	3	3	1	1	2.00	1.50
FR	1	1	3	2	1.75	3	1	3	5	2.33	2.00
TLD	1	1	1	1	1.00	2	3	1	1	2.25	1.62
TT	1	1	1	1	1.00	2	1	1	1	1.25	1.12
DR	2	2	1	2	1.75	3	4	1	2	2.50	2.12

ECA TASK SCORE DESCRIPTION = 10.2

ECA TASK SCORE NO DESCRIPTION = 73.8

ECA TASK SCORE OVERALL (IN) = 31.6

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = PERFORM IMMEDIATE ACTION FOR TOW MISFIRE  
(071-316-2504)

PP = 4

TT = 1.91

ECA TASK SCORE OVERALL (UNIT + AOSP DATA) = 52.62

PERFORM IMMEDIATE ACTION FOR AN M220 LAUNCHER SYSTEM MISFIRE

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	1	1	1	1.00
TLD	1	1	1	1	1	1.00
TT	1	1	1	1	1	1.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	1	1	1	1	2	1.20	1.10
TLD	1	1	1	1	1	1.00	1.00
TT	1	1	1	1	1	1.00	1.00

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	1	1	1	1	1.00	1.07
TLD	1	1	1	1	1	1.00	1.00
TT	2	1	1	2	1	1.40	1.13

ECA TASK SCORE DESCRIPTION = 1.1

ECA TASK SCORE NO DESCRIPTION = 1.4

ECA TASK SCORE OVERALL (OSUT) = 1.2

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100



COLLIMATE AN AN/TAS-4 SERIES NIGHT SIGHT TO AN M220  
LAUNCHER SYSTEM OPTICAL SIGHT

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	G 1	G 2	AVERAGE	G 3	G 4	AVERAGE	
PP	1	4	2.50	2	4	3.00	2.75
TPD	1	1	1.00	1	1	1.00	1.00
FR	4	4	4.00	4	4	4.00	4.00
TLD	1	1	1.00	1	1	1.00	1.00
TT	1	1	1.00	1	1	1.00	1.00
DR	1	1	1.00	1	1	1.00	1.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 10.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 12.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 11.0

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	G 1	G 2	TOTAL	%	G 3	G 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = BORESIGHT AN/TAS-4 NIGHT SIGHT TO DAYSIGHT TRACKER  
(071-316-2901)

PP = 3

TT = 2.14

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 18.09

COLLIMATE AN AN/TAS-4 SERIES NIGHT SIGHT TO AN M220 LAUNCHER SYSTEM OPTICAL SIGHT

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	2	4	3.50	3	2	4	2	2.75	3.12
TPD	1	1	1	3	1.50	2	2	1	1	1.50	1.50
FR	3	4	4	3	3.50	4	3	3	5	3.33	3.43
TLD	3	1	1	3	2.00	2	3	1	1	2.25	2.12
TT	1	1	1	3	1.50	1	1	1	1	1.00	1.25
DR	3	3	2	2	2.50	3	3	1	2	2.25	2.37

ECA TASK SCORE<sub>DESCRIPTION</sub> = 137.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 69.6

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 101.4

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM				X	25			X		25	25
NOT PROBLEM	X	X	X		75	X	X		X	75	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = BORESIGHT AN/TAS-4 NIGHT SIGHT TO DAYSIGHT TRACKER  
(071-316-2901)

PP = 3

TT = 2.14

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 134.47

COLLIMATE AN AN/TAS-4 SERIES NIGHT SIGHT  
TO AN M220 LAUNCHER SYSTEM OPTICAL SIGHT

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	1	1	1	1.00
TLD	1	1	1	1	1	1.00
TT	1	1	1	1	2	1.20

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	1	3	1	1	1	1.40	1.20
TLD	1	3	1	1	1	1.40	1.20
TT	1	4	1	1	3	2.00	1.60

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	5	1	2	1	1.25	1.21
TLD	2	5	1	2	2	1.75	1.36
TT	1	5	1	3	2	1.75	1.64

ECA TASK SCORE DESCRIPTION = 2.3

ECA TASK SCORE NO DESCRIPTION = 3.8

ECA TASK SCORE OVERALL (OSUT) = 2.7

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	Y	X	X	X	X	5	100	100

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM	X					1	20	7
NO PROBLEM		X	X	X	X	4	80	93

PERFORM A SYSTEM SELF-TEST ON AN M220A2 LAUNCHER SYSTEM

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	G 1	G 2	AVERAGE	G 3	G 4	AVERAGE	
PP	1	4	2.50	2	4	3.00	2.75
TPD	1	2	1.50	1	1	1.00	1.25
FR	4	4	4.00	4	4	4.00	4.00
TLD	1	2	1.50	1	2	1.50	1.50
TT	1	2	1.50	1	1	1.00	1.25
DR	1	2	1.50	1	1	1.00	1.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 50.6

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 18.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 32.2

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	G 1	G 2	TOTAL	%	G 3	G 4	TOTAL	%		
PROBLEM		X	1	50			0	0	1	25
NOT PROBLEM	X		1	50	X	X	2	100	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = CONDUCT SYSTEM SELF TEST ON ITV  
(071-316-2525)

PP = 2

TT = 2.83

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 45.52

PERFORM A SYSTEM SELF-TEST ON AN M220A2 LAUNCHER SYSTEM

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	2	4	3.50	4	2	4	1	2.75	3.12
TPD	1	1	1	3	1.50	1	3	1	1	1.50	1.50
FR	4	4	4	2	3.50	4	3	4	5	3.67	3.57
TLD	1	1	1	3	1.50	1	3	2	1	2.25	1.87
TT	1	1	1	3	1.50	1	1	2	1	1.25	1.37
DR	1	1	1	2	1.25	3	4	2	2	2.75	2.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 51.7

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 117.0

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 86.3

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = CONDUCT SYSTEM SELF TEST ON ITV  
(071-316-2525)

PP = 2

TT = 2.83

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 107.67

PERFORM A SYSTEM SELF-TEST ON AN M220A2 LAUNCHER SYSTEM

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	1	1	1	1.00
TLD	2	1	1	1	1	1.20
TT	4	1	1	1	1	1.60

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	1	2	1	1	1	1.20	1.10
TLD	1	2	1	1	1	1.20	1.20
TT	1	4	1	1	1	1.60	1.60

	OSUT1	OSUT2	GROUP EFMD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFMD AVERAGE
TPD	2	5	1	1	1	1.25	1.14
TLD	3	5	1	1	1	1.50	1.29
TT	4	5	1	3	1	2.25	1.79

ECA TASK SCORE DESCRIPTION = 2.1

ECA TASK SCORE NO DESCRIPTION = 4.2

ECA TASK SCORE OVERALL (OSUT) = 2.6

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

	OSUT1	OSUT2	GROUP EFMD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFMD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

TOW A TRACKED VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	5	5	0.00	3	5	3.00	3.00
TPD	5	1	1.00	2	5	2.00	1.50
FR	5	1	1.00	2	5	2.00	1.50
TLD	5	5	0.00	2	5	2.00	2.00
TT	5	5	0.00	1	5	1.00	1.00
DR	5	5	0.00	1	5	1.00	1.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 1.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 24.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 13.5

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM	X		1	50			0	0	1	33
NOT PROBLEM		X	1	50	X		1	100	2	67

NOTE: D 4 had no opinion.

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

TOW A TRACKED VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	1	1	2	1	1.25	3	1	2	1	1.75	1.50
TPD	3	3	1	2	2.25	3	3	2	1	2.25	2.25
FR	1	1	2	2	1.50	3	1	2	5	2.00	1.71
TLD	2	2	1	2	1.75	2	3	1	1	2.00	1.87
TT	2	2	1	2	1.75	2	2	1	1	1.50	1.62
DR	3	3	2	2	2.50	2	3	1	2	2.00	2.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 32.3

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 47.3

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 39.7

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM				X	25	X	X			50	38
NOT PROBLEM	X	X	X		75			X	X	50	63

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.



MAINTAIN THE AIR CLEANER SYSTEM ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	1	2	1.50	4	4	4.00	2.75
TPD	1	1	1.00	1	1	1.00	1.00
FR	2	4	3.00	4	4	4.00	3.50
TLD	1	1	1.00	1	1	1.00	1.00
TT	1	1	1.00	2	1	1.50	1.25
DR	1	2	1.50	1	1	1.00	1.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 6.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 24.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 15.0

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE AIR CLEANER SYSTEM ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	2	2.75	2	1	4	2	2.25	2.50
TPD	1	1	1	1	1.00	2	2	1	1	1.50	1.25
FR	4	4	4	3	3.75	4	4	4	4	4.00	3.87
TLD	1	1	1	1	1.00	3	1	1	1	2.25	1.62
TT	1	1	1	1	1.00	1	1	1	1	1.00	1.00
DR	1	1	1	1	1.00	2	2	1	2	1.75	1.37

ECA TASK SCORE DESCRIPTION = 10.3

ECA TASK SCORE NO DESCRIPTION = 53.2

ECA TASK SCORE OVERALL (IN) = 27.1

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	%	
PROBLEM					0					0	0	
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100	

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE ELECTRICAL SYSTEM ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	5	1	1.00	1	4	2.50	2.00
TPD	5	1	1.00	1	1	1.00	1.00
FR	5	4	4.00	3	3	3.00	3.33
TLD	5	1	1.00	1	1	1.00	1.00
TT	5	1	1.00	3	1	2.00	1.67
DR	5	5	0.00	2	1	1.50	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 4.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 22.5

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 16.7

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0	X		1	50	1	25
NOT PROBLEM	X	X	2	100		X	1	50	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE ELECTRICAL SYSTEM ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	3	1	2	5	2.00	2	1	4	1	2.00	2.00
TPD	2	2	1	5	1.67	3	1	1	2	1.75	1.71
FR	3	3	4	5	3.33	3	4	4	2	3.25	3.29
TLD	2	2	1	5	1.67	3	1	2	1	2.25	2.00
TT	1	1	1	5	1.00	3	1	1	1	1.75	1.43
DR	2	2	2	5	2.00	2	2	1	1	1.50	1.71

ECA TASK SCORE<sub>DESCRIPTION</sub> = 37.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 67.2

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 55.2

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM				X	25					0	13
NOT PROBLEM	X	X	X		75	X	X	X	X	100	88

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE BRAKE SYSTEM ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	2	3	2.50	4	4	4.00	3.25
TPD	2	1	1.50	2	1	1.50	1.50
FR	3	4	3.50	4	3	3.50	3.50
TLD	2	1	1.50	2	1	1.50	1.50
TT	1	1	1.00	2	1	1.50	1.25
DR	2	5	2.00	1	1	1.00	1.33

ECA TASK SCORE<sub>DESCRIPTION</sub> = 39.4

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 47.3

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 42.6

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM	X		1	50			0	0	1	25
NOT PROBLEM		X	1	50	X	X	2	100	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE BRAKE SYSTEM ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	2	2	2	5	2.00	2	1	4	1	2.00	2.00
TPD	3	3	1	5	2.33	3	2	1	2	2.00	2.14
FR	3	3	4	5	3.33	3	4	4	5	3.67	3.50
TLD	3	3	1	5	2.33	3	2	1	2	2.75	2.57
TT	2	2	1	5	1.67	3	1	2	1	1.50	1.57
DR	3	3	1	5	2.33	3	2	1	2	2.25	2.29

ECA TASK SCORE<sub>DESCRIPTION</sub> = 141.2

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 136.1

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 138.5

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM				X	25					0	14
NOT PROBLEM	X	X	X		75		X	X	X	100	86

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE COOLING SYSTEM ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	1	2	1.50	4	4	4.00	2.75
TPD	1	1	1.00	1	1	1.00	1.00
FR	3	4	3.50	4	4	4.00	3.75
TLD	1	1	1.00	1	1	1.00	1.00
TT	1	1	1.00	2	1	1.50	1.25
DR	1	5	1.00	1	1	1.00	1.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 5.3

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 24.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 12.9

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE COOLING SYSTEM ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	2	2.75	2	1	4	1	2.00	2.37
TPD	1	1	1	2	1.25	2	1	1	1	1.25	1.25
FR	4	4	4	2	3.50	3	4	4	5	3.67	3.57
TLD	1	1	1	2	1.25	2	2	1	1	2.25	1.75
TT	1	1	1	1	1.00	2	1	1	1	1.25	1.12
DR	1	1	1	2	1.25	2	1	1	2	1.50	1.37

ECA TASK SCORE<sub>DESCRIPTION</sub> = 18.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 38.7

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 28.7

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100		X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.



MAINTAIN THE ENGINE ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	3	2	2.50	4	4	4.00	3.25
TPD	2	1	1.50	3	1	2.00	1.75
FR	4	4	4.00	4	4	4.00	4.00
TLD	2	1	1.50	3	1	2.00	1.75
TT	2	1	1.50	4	1	2.50	2.00
DR	3	1	2.00	2	1	1.50	1.75

ECA TASK SCORE<sub>DESCRIPTION</sub> = 67.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 240.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 139.3

	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE ENGINE ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	2	2.75	3	1	4	2	2.50	2.62
TPD	3	2	1	3	2.25	2	2	2	1	1.75	2.00
FR	4	4	4	3	3.75	4	4	4	5	4.00	3.86
TLD	3	3	1	3	2.50	3	3	2	1	2.75	2.62
TT	2	4	1	3	2.50	2	2	2	1	1.75	2.12
DR	2	2	1	3	2.00	2	3	1	2	2.25	2.12

ECA TASK SCORE<sub>DESCRIPTION</sub> = 290.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 189.5

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 240.0

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100		X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE FUEL SYSTEM ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	1	1	1.00	4	4	4.00	2.50
TPD	1	2	1.50	1	1	1.00	1.25
FR	1	2	1.50	4	4	4.00	2.75
TLD	1	2	1.50	1	1	1.00	1.25
TT	1	1	1.00	2	1	1.50	1.25
DR	1	3	2.00	1	1	1.00	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 6.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 24.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 20.1

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE FUEL SYSTEM ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	3	2	1	2	2.00	5	1	4	2	2.33	2.14
TPD	2	2	1	2	1.75	5	2	1	1	1.33	1.57
FR	3	3	4	3	3.25	5	4	4	5	4.00	3.50
TLD	1	2	1	2	1.50	5	2	1	1	2.33	1.86
TT	1	1	1	1	1.00	5	2	1	1	1.33	1.14
DR	1	1	1	2	1.25	5	2	1	2	1.67	1.43

ECA TASK SCORE<sub>DESCRIPTION</sub> = 21.3

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 64.5

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 35.7

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%		%
PROBLEM		X			25					0		14
NOT PROBLEM	X		X	X	75		X	X	X	100		86

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE STEERING SYSTEM ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	1	1	1.00	4	1	2.50	1.75
TPD	1	1	1.00	2	1	1.50	1.25
FR	3	4	3.50	4	3	3.50	3.50
TLD	2	1	1.50	2	1	1.50	1.50
TT	1	1	1.00	2	1	1.50	1.25
DR	1	1	1.00	1	1	1.00	1.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 5.3

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 29.5

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 14.4

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE STEERING SYSTEM ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	3	2	1	5	2.00	5	1	4	1	2.00	2.00
TPD	1	2	1	5	1.33	5	2	3	1	2.00	1.67
FR	3	3	4	5	3.33	5	4	4	5	4.00	3.60
TLD	1	2	1	5	1.33	5	2	2	1	2.33	1.83
TT	1	3	1	5	1.67	5	1	3	1	1.33	1.50
DR	1	1	1	5	1.00	5	1	1	2	2.00	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 19.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 99.6

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 49.5

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM				X	25			X		33	29
NOT PROBLEM	X	X	X		75		X		X	67	71

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE TRANSMISSION SYSTEM ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	1	5	1.00	4	4	4.00	3.00
TPD	1	1	1.00	2	1	1.50	1.25
FR	4	2	3.00	4	4	4.00	3.50
TLD	1	1	1.00	2	1	1.50	1.25
TT	1	1	1.00	2	1	1.50	1.25
DR	1	5	1.00	1	1	1.00	1.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 3.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 54.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 20.5

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE TRANSMISSION SYSTEM ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	2	2.75	5	1	4	1	2.00	2.43
TPD	2	2	1	1	1.50	5	2	3	1	2.00	1.71
FR	4	4	4	2	3.50	5	4	4	5	4.00	3.67
TLD	1	1	1	2	1.25	5	3	2	1	2.67	1.86
TT	1	1	1	1	1.00	5	2	3	1	1.67	1.29
DR	2	2	1	2	1.75	5	3	1	2	2.67	2.14

ECA TASK SCORE DESCRIPTION = 31.6

ECA TASK SCORE NO DESCRIPTION = 189.6

ECA TASK SCORE OVERALL (IN) = 78.1

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM				X	25					0	14
NOT PROBLEM	X	X	X		75		X	X	X	100	86

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.



MAINTAIN THE PERSONNEL HEATER ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	2	1	1.50	4	5	4.00	2.33
TPD	2	1	1.50	4	5	4.00	2.33
FR	2	4	3.00	4	5	4.00	3.33
TLD	2	1	1.50	3	5	3.00	2.00
TT	1	1	1.00	2	5	2.00	1.33
DR	2	1	1.50	3	5	3.00	2.00

ECA TASK SCORE DESCRIPTION = 15.2

ECA TASK SCORE NO DESCRIPTION = 1152.0

ECA TASK SCORE OVERALL (UNIT) = 96.2

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0	X		1	100	1	33
NOT PROBLEM	X	X	2	100			0	0	2	67

NOTE: D 4 had no opinion.

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE PERSONNEL HEATER ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	2	2.75	3	1	4	1	2.25	2.50
TPD	2	2	1	2	1.75	4	2	1	2	2.25	2.00
FR	3	3	4	2	3.00	1	3	4	5	2.67	2.86
TLD	2	2	1	2	1.75	3	2	1	2	2.75	2.25
TT	1	1	1	1	1.00	1	1	1	1	1.00	1.00
DR	2	2	1	2	1.75	2	3	1	2	2.00	1.87

ECA TASK SCORE DESCRIPTION = 44.2

ECA TASK SCORE NO DESCRIPTION = 74.3

ECA TASK SCORE OVERALL (IN) = 60.3

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0		X	X		67	29
NOT PROBLEM	X	X	X	X	100				X	33	71

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE FIRE SUPPRESSION SYSTEM  
ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	1	1	1.00	4	3	3.50	2.25
TPD	1	1	1.00	1	1	1.00	1.00
FR	4	4	4.00	4	3	3.50	3.75
TLD	1	1	1.00	1	1	1.00	1.00
TT	1	1	1.00	2	1	1.50	1.25
DR	1	2	1.50	1	1	1.00	1.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 6.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 18.4

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 13.8

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE FIRE SUPPRESSION SYSTEM ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	2	2.75	3	2	4	1	2.50	2.62
TPD	1	1	1	2	1.25	3	2	1	1	1.75	1.50
FR	4	4	4	2	3.50	5	3	4	5	3.50	3.50
TLD	1	1	1	1	1.00	5	2	1	1	2.33	1.57
TT	1	1	1	5	1.00	5	2	1	1	1.33	1.17
DR	1	1	1	2	1.25	5	2	1	2	1.67	1.43

ECA TASK SCORE<sub>DESCRIPTION</sub> = 15.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 79.4

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 36.1

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM				X	25					0	14
NOT PROBLEM	X	X	X		75		X	X	X	100	86

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE EXHAUST SYSTEM ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	1	2	1.50	4	5	4.00	2.33
TPD	1	1	1.00	2	5	2.00	1.33
FR	3	4	3.50	4	5	4.00	3.67
TLD	1	1	1.00	2	5	2.00	1.33
TT	1	1	1.00	2	5	2.00	1.33
DR	1	5	1.00	1	5	1.00	1.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 5.3

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 128.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 20.1

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X		1	100	3	100

NOTE: D 4 had no opinion.

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE EXHAUST SYSTEM ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	3	1	2	2.50	5	1	4	1	2.00	2.29
TPD	2	2	1	2	1.75	5	2	2	3	2.33	2.00
FR	3	3	4	2	3.00	5	4	4	5	4.00	3.33
TLD	1	1	1	2	1.25	5	2	1	3	3.00	2.00
TT	1	1	1	2	1.25	5	2	1	1	1.33	1.29
DR	1	1	1	2	1.25	5	1	1	2	1.33	1.29

ECA TASK SCORE DESCRIPTION = 25.6

ECA TASK SCORE NO DESCRIPTION = 99.6

ECA TASK SCORE OVERALL (IN) = 50.4

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	%	%
PROBLEM					0				X	33		14
NOT PROBLEM	X	X	X	X	100		X	X		67		86

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE BILGE SYSTEM ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	1	3	2.00	4	4	4.00	3.00
TPD	1	1	1.00	1	1	1.00	1.00
FR	3	4	3.50	4	4	4.00	3.75
TLD	1	1	1.00	1	1	1.00	1.00
TT	1	1	1.00	2	1	1.50	1.25
DR	1	1	1.00	1	1	1.00	1.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 7.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 24.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 14.1

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE BILGE SYSTEM ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	2	2	1	2	1.75	1	1	4	1	1.75	1.75
TPD	1	2	1	2	1.50	4	1	2	1	2.00	1.75
FR	2	2	4	2	2.50	5	3	4	5	3.50	2.83
TLD	1	2	1	2	1.50	5	2	2	1	2.33	1.86
TT	1	3	1	1	1.50	5	1	2	1	1.33	1.43
DR	2	2	1	2	1.75	5	1	2	1	1.33	1.57

ECA TASK SCORE DESCRIPTION = 25.8

ECA TASK SCORE NO DESCRIPTION = 50.8

ECA TASK SCORE OVERALL (IN) = 36.2

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100		X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.



MAINTAIN THE HYDRAULIC SYSTEM ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	2	1	1.50	4	4	4.00	2.75
TPD	1	1	1.00	3	1	2.00	1.50
FR	3	4	3.50	4	4	4.00	3.75
TLD	1	1	1.00	2	1	1.50	1.25
TT	1	1	1.00	2	1	1.50	1.25
DR	1	1	1.00	2	1	1.50	1.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 5.3

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 108.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 30.2

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE HYDRAULIC SYSTEM ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	5	3.00	5	1	4	1	2.00	2.50
TPD	1	1	1	5	1.00	5	3	2	5	2.50	1.60
FR	4	4	4	5	4.00	5	3	4	5	3.50	3.80
TLD	1	1	1	5	1.00	5	2	2	5	3.00	1.80
TT	1	1	1	5	1.00	5	2	3	5	2.00	1.40
DR	1	1	1	5	1.00	5	2	1	5	2.50	1.60

ECA TASK SCORE<sub>DESCRIPTION</sub> = 12.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 262.5

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 61.3

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM				X	25			X		33	29
NOT PROBLEM	X	X	X		75		X		X	67	71

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE TRACK AND SUSPENSION SYSTEM  
ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	2	1	1.50	4	4	4.00	2.75
TPD	3	1	2.00	2	1	1.50	1.75
FR	4	4	4.00	4	4	4.00	4.00
TLD	1	1	1.00	3	1	2.00	1.50
TT	2	1	1.50	3	1	2.00	1.75
DR	2	1	1.50	3	1	2.00	1.75

ECA TASK SCORE<sub>DESCRIPTION</sub> = 27.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 192.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 88.4

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE TRACK AND SUSPENSION SYSTEM ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	3	4	1	4	3.00	2	2	4	2	2.50	2.75
TPD	2	1	1	4	2.00	2	4	3	1	2.50	2.25
FR	4	4	4	4	4.00	4	2	4	5	3.33	3.71
TLD	2	2	1	3	2.00	2	4	2	1	2.75	2.37
TT	2	2	1	3	2.00	1	3	3	1	1.75	1.87
DR	2	1	1	2	1.50	2	3	2	2	2.50	2.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 144.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 250.7

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 204.7

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	%	%
PROBLEM				X	25		X			25		25
NOT PROBLEM	X	X	X		75	X		X	X	75		75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE HULL ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	1	1	1.00	4	1	2.50	1.75
TPD	1	1	1.00	2	1	1.50	1.25
FR	2	4	3.00	4	1	2.50	2.75
TLD	2	1	1.50	2	1	1.50	1.50
TT	1	1	1.00	2	1	1.50	1.25
DR	2	1	1.50	1	1	1.00	1.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 6.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 21.1

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 14.1

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN THE HULL ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	2	2.75	2	1	4	2	2.25	2.50
TPD	2	1	1	2	1.50	4	3	1	1	2.25	1.87
FR	3	3	4	2	3.00	5	3	4	4	3.67	3.29
TLD	1	1	1	1	1.00	4	3	1	1	3.00	2.00
TT	3	3	1	2	2.25	5	2	1	1	1.33	1.86
DR	1	1	1	2	1.25	5	3	1	3	2.33	1.71

ECA TASK SCORE<sub>DESCRIPTION</sub> = 34.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 173.3

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 98.1

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (ADSP) DATA: None available.

OPERATE THE M19 PERISCOPE ON AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	1	4	2.50	5	5	0.00	2.50
TPD	1	1	1.00	5	5	0.00	1.00
FR	1	3	2.00	4	5	4.00	2.67
TLD	1	1	1.00	5	5	0.00	1.00
TT	1	1	1.00	5	5	0.00	1.00
DR	1	5	1.00	5	5	0.00	1.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 5.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 0.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 15.0

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM			0	0	X		1	100	1	33
NOT PROBLEM	X	X	2	100			0	0	2	67

NOTE: D 4 had no opinion.

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

OPERATE THE M19 PERISCOPE ON AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	1	1	1	4	1.75	3	1	4	1	2.25	2.00
TPD	3	1	1	1	1.50	3	3	1	5	2.33	1.86
FR	1	1	3	1	1.50	4	1	4	5	3.00	2.14
TLD	2	2	1	1	1.50	4	3	1	5	3.67	2.43
TT	1	1	1	1	1.00	1	2	1	5	1.33	1.14
DR	2	2	2	2	2.00	2	4	1	5	2.33	2.14

ECA TASK SCORE<sub>DESCRIPTION</sub> = 11.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 179.7

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 47.3

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	%	
PROBLEM					0			X		25	13	
NOT PROBLEM	X	X	X	X	100	X	X		X	75	88	

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.



START AN M113-SERIES VEHICLE USING AUXILIARY POWER

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	1	1	1.00	4	4	4.00	2.50
TPD	1	1	1.00	1	1	1.00	1.00
FR	2	3	2.50	3	4	3.50	3.00
TLD	1	1	1.00	1	1	1.00	1.00
TT	1	1	1.00	2	1	1.50	1.25
DR	1	1	1.00	1	1	1.00	1.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 2.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 21.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 9.4

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM		X	1	50			0	0	1	25
NOT PROBLEM	X		1	50	X	X	2	100	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = START TRACKED VEHICLE USING AUXILIARY POWER

PP = 1

TT = 1.86

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 8.19

# START AN M113-SERIES VEHICLE USING AUXILIARY POWER

## INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	2	2	2	2	2.00	3	1	4	1	2.25	2.12
TPD	1	1	1	1	1.00	1	2	1	5	1.33	1.14
FR	2	2	2	1	1.75	5	2	2	5	2.00	1.83
TLD	1	1	1	1	1.00	1	3	1	5	2.00	1.43
TT	1	1	1	2	1.25	1	2	1	5	1.33	1.29
DR	1	1	1	1	1.00	2	3	1	5	2.00	1.43

ECA TASK SCORE<sub>DESCRIPTION</sub> = 4.4

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 32.0

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 11.7

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM				X	25					0	13
NOT PROBLEM	X	X	X		75	X	X	X	X	100	88

## ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = START TRACKED VEHICLE USING AUXILIARY POWER

PP = 1

TT = 1.86

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 7.35

DRIVE AN M113-SERIES VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	1	1	1.00	4	4	4.00	2.50
TPD	1	1	1.00	3	1	2.00	1.50
FR	4	3	3.50	4	4	4.00	3.75
TLD	1	1	1.00	3	1	2.00	1.50
TT	1	1	1.00	4	1	2.50	1.75
DR	1	1	1.00	4	1	2.50	1.75

ECA TASK SCORE<sub>DESCRIPTION</sub> = 3.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 400.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 64.6

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM		X	1	50			0	0	1	25
NOT PROBLEM	X		1	50	X	X	2	100	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

DRIVE AN M113-SERIES VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	2	2.75	4	2	4	2	3.00	2.87
TPD	2	2	1	1	1.50	1	3	1	1	1.50	1.50
FR	2	2	4	3	2.75	4	4	4	5	4.00	3.29
TLD	2	2	1	1	1.50	1	3	1	1	2.25	1.87
TT	4	4	1	3	3.00	1	4	3	1	1.75	2.37
DR	2	2	1	1	1.50	3	2	1	5	2.67	2.00

ECA TASK SCORE<sub>DESCRIPTION</sub> = 76.6

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 189.0

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 126.2

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	% %	
PROBLEM					0					0	0	
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100	

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN INTERCOMMUNICATIONS SET AN/VIC-1  
ON A TRACKED VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	D 1	D 2	AVERAGE	D 3	D 4	AVERAGE	
PP	3	5	3.00	4	1	2.50	2.67
TPD	3	1	2.00	3	1	2.00	2.00
FR	3	3	3.00	4	3	3.50	3.25
TLD	3	1	2.00	2	1	1.50	1.75
TT	2	1	1.50	2	1	1.50	1.50
DR	3	2	2.50	3	1	2.00	2.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 135.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 78.8

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 102.5

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	D 1	D 2	TOTAL	%	D 3	D 4	TOTAL	%		
PROBLEM	X		1	50	X		1	50	2	50
NOT PROBLEM		X	1	50		X	1	50	2	50

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN INTERCOMMUNICATIONS SET AN/VIC-1 ON A TRACKED VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	3	4	1	2	2.50	2	1	4	1	2.00	2.25
TPD	1	1	1	2	1.25	1	3	2	1	1.75	1.50
FR	3	3	4	2	3.00	3	3	4	5	3.33	3.14
TLD	1	1	1	2	1.25	1	3	2	1	2.25	1.75
TT	1	1	1	1	1.00	1	2	1	1	1.50	1.25
DR	1	1	1	2	1.25	3	3	1	2	2.25	1.75

ECA TASK SCORE<sub>DESCRIPTION</sub> = 14.6

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 88.6

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 40.6

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0	X				25	13
NOT PROBLEM	X	X	X	X	100		X	X	X	75	88

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

LOAD AN M243 OR M259 SMOKE GRENADE LAUNCHER

JOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	L 1	L 2	AVERAGE	L 3	L 4	AVERAGE	
PP	3	5	3.00	1	1	1.00	1.67
TPD	1	5	1.00	1	2	1.50	1.33
FR	1	5	1.00	1	1	1.00	1.00
TLD	1	5	1.00	1	1	1.00	1.00
TT	1	5	1.00	5	1	1.00	1.00
DR	1	5	1.00	5	2	2.00	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 3.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 3.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 3.3

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	L 1	L 2	TOTAL	%	L 3	L 4	TOTAL	%		
PROBLEM			0	0	X		1	50	1	25
NOT PROBLEM	X	X	2	100		X	1	50	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = LOAD ITV M243 SMOKE GRENADE LAUNCHER  
(071)-316-2909)

PP = 1

TT = 2.40

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 4.54

LOAD AN M243 OR M259 SMOKE GRENADE LAUNCHER

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	3	4	1	2	2.50	2	1	4	1	2.00	2.25
TPD	1	1	1	1	1.00	1	2	1	1	1.25	1.12
FR	1	1	3	2	1.75	3	1	3	5	2.33	2.00
TLD	1	1	1	2	1.25	1	2	1	1	1.75	1.50
TT	1	1	1	1	1.00	1	1	1	1	1.00	1.00
DR	1	1	1	2	1.25	3	1	1	1	1.50	1.37

ECA TASK SCORE<sub>DESCRIPTION</sub> = 6.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 15.3

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 10.4

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0			X		25	13
NOT PROBLEM	X	X	X	X	100	X	X		X	75	88

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = LOAD ITV M243 SMOKE GRENADE LAUNCHER  
(071-316-2909)

PP = 1

TT = 2.40

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 12.76



LOAD AN M243 OR M259 SMOKE GRENADE LAUNCHER

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	1	1	1	1.00
TLD	1	1	1	1	1	1.00
TT	1	1	1	1	2	1.20

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	2	5	5	5	1	1.50	1.14
TLD	2	5	5	5	1	1.50	1.14
TT	1	5	5	5	1	1.00	1.14

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	5	1	1	5	1.00	1.11
TLD	1	5	1	1	5	1.00	1.11
TT	1	5	1	2	5	1.33	1.20

ECA TASK SCORE DESCRIPTION = 1.5

ECA TASK SCORE NO DESCRIPTION = 1.3

ECA TASK SCORE OVERALL (OSUT) = 1.5

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X		X	4	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM			X			1	33	14
NO PROBLEM	X				X	2	67	86

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	10
NO PROBLEM	X		X	X		3	100	90

UNLOAD AN M243 OR M259 SMOKE GRENADE LAUNCHER

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	L 1	L 2	AVERAGE	L 3	L 4	AVERAGE	
PP	2	5	2.00	1	2	1.50	1.67
TPD	1	5	1.00	1	2	1.50	1.33
FR	1	5	1.00	1	2	1.50	1.33
TLD	1	5	1.00	1	1	1.00	1.00
TT	1	5	1.00	5	2	2.00	1.50
DR	1	5	1.00	5	2	2.00	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 2.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 13.5

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 5.0

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	L 1	L 2	TOTAL	%	L 3	L 4	TOTAL	%		
PROBLEM			0	0	X		1	50	1	25
NOT PROBLEM	X	X	2	100		X	1	50	3	75

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

UNLOAD AN M243 OR M259 SMOKE GRENADE LAUNCHER

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	1	4	1	2	2.00	2	1	4	1	2.00	2.00
TPD	1	1	1	2	1.25	1	2	1	1	1.25	1.25
FR	1	1	3	2	1.75	3	1	3	5	2.33	2.00
TLD	1	1	1	2	1.25	1	2	1	1	1.75	1.50
TT	1	1	1	1	1.00	1	1	1	1	1.00	1.00
DR	1	1	1	2	1.25	3	1	1	1	1.50	1.37

ECA TASK SCORE<sub>DESCRIPTION</sub> = 6.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 15.3

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 10.3

	DESCRIPTION					NO DESCRIPTION					OVERALL	
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	%	
PROBLEM					0			X		25	13	
NOT PROBLEM	X	X	X	X	100	X	X		X	75	88	

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

UNLOAD AN M243 OR M259 SMOKE GRENADE LAUNCHER

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	1	1	1	1.00
TLD	1	1	1	1	1	1.00
TT	1	1	1	1	1	1.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	2	1	5	5	1	1.33	1.13
TLD	2	1	5	5	1	1.33	1.13
TT	1	2	5	5	1	1.33	1.13

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	5	1	1	5	1.00	1.09
TLD	1	5	1	1	5	1.00	1.09
TT	1	5	1	2	5	1.33	1.18

ECA TASK SCORE DESCRIPTION = 1.4

ECA TASK SCORE NO DESCRIPTION = 1.3

ECA TASK SCORE OVERALL (OSUT) = 1.4

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X		X	4	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM			X			1	33	14
NO PROBLEM	X				X	2	67	86

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	10
NO PROBLEM	X		X	X		3	100	90

PERFORM MISFIRE PROCEDURES ON AN M243 SMOKE GRENADE LAUNCHER

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	L 1	L 2	AVERAGE	L 3	L 4	AVERAGE	
PP	2	5	2.00	2	2	2.00	2.00
TPD	1	5	1.00	2	1	1.50	1.33
FR	1	5	1.00	1	1	1.00	1.00
TLD	1	5	1.00	2	1	1.50	1.33
TT	1	5	1.00	2	1	1.50	1.33
DR	1	5	1.00	2	2	2.00	1.67

ECA TASK SCORE<sub>DESCRIPTION</sub> = 2.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 13.5

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 7.9

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	L 1	L 2	TOTAL	%	L 3	L 4	TOTAL	%		
PROBLEM	X		1	50	X		1	50	2	50
NOT PROBLEM		X	1	50		X	1	50	2	50

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

PERFORM MISFIRE PROCEDURES ON AN M243 SMOKE GRENADE LAUNCHER

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	3	4	1	2	2.50	2	1	4	1	2.00	2.25
TPD	1	1	1	2	1.25	1	3	1	1	1.50	1.37
FR	1	1	2	2	1.50	3	1	2	5	2.00	1.71
TLD	1	1	1	1	1.00	1	3	1	1	1.75	1.37
TT	1	1	1	1	1.00	1	1	1	1	1.00	1.00
DR	1	1	1	5	1.00	2	3	1	1	1.75	1.43

ECA TASK SCORE DESCRIPTION = 4.7

ECA TASK SCORE NO DESCRIPTION = 18.4

ECA TASK SCORE OVERALL (IN) = 10.4

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

PERFORM MISFIRE PROCEDURES ON AN M243 SMOKE GRENADE LAUNCHER

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	5	1	1	1	1	1.00
TLD	5	1	1	1	1	1.00
TT	5	1	1	1	1	1.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	5	1	5	5	1	1.00	1.00
TLD	5	1	5	5	1	1.00	1.00
TT	5	1	5	5	1	1.00	1.00

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	5	1	1	5	1.00	1.00
TLD	1	5	1	2	5	1.33	1.11
TT	1	5	1	2	5	1.33	1.11

ECA TASK SCORE DESCRIPTION = 1.0

ECA TASK SCORE NO DESCRIPTION = 1.8

ECA TASK SCORE OVERALL (OSUT) = 1.2

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X		X	4	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM			X		X	2	67	29
NO PROBLEM	X					1	33	71

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	20
NO PROBLEM	X		X	X		3	100	80

MAINTAIN AN M243 OR M259 SMOKE GRENADE LAUNCHER

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	L 1	L 2	AVERAGE	L 3	L 4	AVERAGE	
PP	1	1	1.00	5	2	2.00	1.33
TPD	1	1	1.00	1	1	1.00	1.00
FR	1	4	2.50	5	1	1.00	2.00
TLD	1	1	1.00	1	1	1.00	1.00
TT	1	1	1.00	1	2	1.50	1.25
DR	1	1	1.00	1	2	1.50	1.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 2.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 4.5

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 6.2

	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	L 1	L 2	TOTAL	%	L 3	L 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.



MAINTAIN AN M243 OR M259 SMOKE GRENADE LAUNCHER

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	3	4	1	2	2.50	2	1	4	1	2.00	2.25
TPD	1	1	1	2	1.25	1	1	1	1	1.00	1.12
FR	1	1	2	2	1.50	4	3	4	5	3.67	2.43
TLD	1	1	1	2	1.25	1	1	1	1	1.75	1.50
TT	1	1	1	1	1.00	1	1	1	1	1.00	1.00
DR	1	1	1	2	1.25	2	1	1	1	1.25	1.25

ECA TASK SCORE<sub>DESCRIPTION</sub> = 7.3

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 16.0

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 11.5

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

MAINTAIN AN M243 OR M259 SMOKE GRENADE LAUNCHER

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	1	1	1	1.00
TLD	1	1	1	1	1	1.00
TT	1	1	1	1	1	1.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	5	5	5	5	5	N/A	1.00
TLD	5	5	5	5	5	N/A	1.00
TT	5	5	5	5	3	3.00	1.33

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	5	1	1	5	1.00	1.00
TLD	1	5	1	1	5	1.00	1.00
TT	1	5	1	2	5	1.33	1.27

ECA TASK SCORE DESCRIPTION = 1.3

ECA TASK SCORE NO DESCRIPTION = 1.3

ECA TASK SCORE OVERALL (OSUT) = 1.3

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X		X	4	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM			X			1	33	14
NO PROBLEM	X				X	2	67	86

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	10
NO PROBLEM	X		X	X		3	100	90

LOAD AN M220 LAUNCHER

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	L 1	L 2	AVERAGE	L 3	L 4	AVERAGE	
PP	1	1	1.00	3	2	2.50	1.75
TPD	1	1	1.00	1	2	1.50	1.25
FR	3	2	2.50	3	2	2.50	2.50
TLD	1	2	1.50	2	1	1.50	1.50
TT	1	1	1.00	2	3	2.50	1.75
DR	1	2	1.50	2	2	2.00	1.75

ECA TASK SCORE<sub>DESCRIPTION</sub> = 3.8

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 70.3

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 25.1

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	L 1	L 2	TOTAL	%	L 3	L 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

LOAD AN M220 LAUNCHER

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	4	3.25	3	1	4	1	2.25	2.75
TPD	1	1	1	1	1.00	1	4	1	1	1.75	1.37
FR	2	2	3	2	2.25	4	3	4	5	3.67	2.86
TLD	1	1	1	2	1.25	1	3	1	1	2.25	1.75
TT	1	1	1	1	1.00	1	1	1	1	1.00	1.00
DR	1	1	1	1	1.00	3	3	1	2	2.25	1.62

ECA TASK SCORE<sub>DESCRIPTION</sub> = 9.1

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 73.1

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 30.7

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

LOAD AN M220 LAUNCHER

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	2	1	1	1	1	1.20
TLD	1	1	1	1	1	1.00
TT	1	1	1	1	2	1.20

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	2	1	1	1	2	1.40	1.30
TLD	2	1	1	1	2	1.40	1.20
TT	1	2	1	1	1	1.20	1.20

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	2	2	1	1	1.40	1.33
TLD	1	1	1	1	1	1.00	1.13
TT	1	2	1	1	1	1.20	1.20

ECA TASK SCORE DESCRIPTION = 1.9

ECA TASK SCORE NO DESCRIPTION = 1.7

ECA TASK SCORE OVERALL (OSUT) = 1.8

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

UNLOAD AN M220 LAUNCHER

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	L 1	L 2	AVERAGE	L 3	L 4	AVERAGE	
PP	1	1	1.00	3	2	2.50	1.75
TPD	1	1	1.00	1	1	1.00	1.00
FR	2	2	2.00	3	3	3.00	2.50
TLD	1	1	1.00	2	1	1.50	1.25
TT	1	1	1.00	2	2	2.00	1.50
DR	1	2	1.50	1	2	1.50	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 3.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 33.8

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 12.3

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	L 1	L 2	TOTAL	%	L 3	L 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

# UNLOAD AN M220 LAUNCHER

## INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	3	3.00	3	1	4	1	2.25	2.62
TPD	2	2	1	2	1.75	1	3	1	1	1.50	1.62
FR	2	2	3	2	2.25	4	3	4	5	3.67	2.86
TLD	1	1	1	2	1.25	1	3	2	1	2.25	1.75
TT	1	1	1	1	1.00	1	1	1	1	1.25	1.12
DR	1	1	1	2	1.25	3	1	1	2	1.75	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 18.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 60.9

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 36.0

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

UNLOAD AN M220 LAUNCHER

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	1	1	1	1.00
TLD	1	1	1	1	1	1.00
TT	1	1	1	1	2	1.20

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	2	1	5	1	1	1.25	1.11
TLD	2	1	5	1	1	1.25	1.11
TT	1	1	5	1	2	1.25	1.22

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	2	1	1	1	1.20	1.14
TLD	1	1	1	1	1	1.00	1.07
TT	1	1	1	1	1	1.00	1.14

ECA TASK SCORE DESCRIPTION = 1.5

ECA TASK SCORE NO DESCRIPTION = 1.2

ECA TASK SCORE OVERALL (OSUT) = 1.4

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100



LOAD A DUAL LAUNCHER WHILE MOUNTED ON AN M901 VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	L 1	L 2	AVERAGE	L 3	L 4	AVERAGE	
PP	1	1	1.00	2	3	2.50	1.75
TPD	2	3	2.50	3	2	2.50	2.50
FR	3	2	2.50	3	3	3.00	2.75
TLD	1	3	2.00	2	3	2.50	2.25
TT	1	2	1.50	2	3	2.50	2.00
DP	1	3	2.00	1	1	1.00	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 37.5

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 117.2

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 81.2

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	L 1	L 2	TOTAL	%	L 3	L 4	TOTAL	%		
PROBLEM	X	X	2	100	X	X	2	100	4	100
NOT PROBLEM			0	0			0	0	0	0

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = LOAD ITV DUAL LAUNCHER WITH ENCASED MISSILE / RETURN TO STOW POSITION  
(071-316-2530)

PP = 2

TT = 2.25

ECA TASK SCORE<sub>OVERALL (UNIT + AOSP DATA)</sub> = 92.91

LOAD A DUAL LAUNCHER WHILE MOUNTED ON AN M901 VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	2	2	3.00	3	1	4	1	2.25	2.62
TPD	3	1	1	2	1.75	1	4	2	1	2.00	1.87
FR	2	2	3	2	2.25	3	3	4	5	3.33	2.71
TLD	1	1	1	2	1.25	1	3	2	1	2.25	1.75
TT	1	1	1	2	1.25	1	1	1	1	1.25	1.25
DR	1	1	1	2	1.25	3	2	1	2	2.00	1.62

ECA TASK SCORE DESCRIPTION = 23.1

ECA TASK SCORE NO DESCRIPTION = 84.4

ECA TASK SCORE OVERALL (IN) = 47.5

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0		X	X	X	75	38
NOT PROBLEM	X	X	X	X	100	X				25	63

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA:

TASK = LOAD ITV DUAL LAUNCHER WITH ENCASED MISSILE / RETURN TO STOW POSITION  
(071-316-2530)

PP = 2

TT = 2.25

ECA TASK SCORE OVERALL (UNIT + AOSP DATA) = 58.08

LOAD A DUAL LAUNCHER WHILE MOUNTED ON AN M901 VEHICLE

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	3	1	1	1	1	1.40
TLD	1	1	1	1	1	1.00
TT	1	1	1	1	2	1.20

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	1	1	1	3	2	1.60	1.50
TLD	1	1	1	1	2	1.20	1.10
TT	1	2	1	1	2	1.40	1.30

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	2	2	2	2	1	1.80	1.60
TLD	1	1	1	1	1	1.00	1.07
TT	1	2	1	3	1	1.60	1.40

ECA TASK SCORE<sub>DESCRIPTION</sub> = 2.1

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 2.9

ECA TASK SCORE<sub>OVERALL (OSUT)</sub> = 2.4

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM				X		1	20
NO PROBLEM	X	X	X		X	4	80

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM				X		1	20	20
NO PROBLEM	X	X	X		X	4	80	80

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	13
NO PROBLEM	X	X	X	X	X	5	100	87

UNLOAD A DUAL LAUNCHER WHILE MOUNTED ON AN M901 VEHICLE

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	L 1	L 2	AVERAGE	L 3	L 4	AVERAGE	
PP	1	1	1.00	2	3	2.50	1.75
TPD	1	2	1.50	2	1	1.50	1.50
FR	3	2	2.50	3	3	3.00	2.75
TLD	1	2	1.50	2	5	2.00	1.67
TT	1	1	1.00	2	2	2.00	1.50
DR	1	2	1.50	1	2	1.50	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 8.4

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 67.5

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 27.1

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	L 1	L 2	TOTAL	%	L 3	L 4	TOTAL	%		
PROBLEM			0	0			0	0	0	0
NOT PROBLEM	X	X	2	100	X	X	2	100	4	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

UNLOAD A DUAL LAUNCHER WHILE MOUNTED ON AN M901 VEHICLE

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	2	2	3.00	3	1	4	1	2.25	2.62
TPD	1	1	1	2	1.25	1	4	2	1	2.00	1.62
FR	2	2	3	3	2.50	3	3	4	5	3.33	2.86
TLD	1	1	1	2	1.25	1	3	1	1	2.25	1.75
TT	1	1	1	3	1.50	1	1	1	1	1.00	1.25
DR	1	1	1	2	1.25	3	2	1	2	2.00	1.62

ECA TASK SCORE<sub>DESCRIPTION</sub> = 22.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 67.5

ECA TASK SCORE<sub>OVERALL (IN)</sub> = 43.3

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0		X	X	X	75	38
NOT PROBLEM	X	X	X	X	100	X				25	63

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

UNLOAD A DUAL LAUNCHER WHILE MOUNTED ON AN M901 VEHICLE

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	1	1	1	1	1	1.00
TLD	1	1	1	1	1	1.00
TT	1	1	1	1	1	1.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	2	1	5	3	1	1.75	1.33
TLD	2	1	5	1	2	1.50	1.22
TT	1	4	5	1	1	1.75	1.33

	OSUT1	OSUT2	GROUP EFMD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFMD AVERAGE
TPD	1	2	1	2	1	1.40	1.36
TLD	1	1	1	1	1	1.00	1.14
TT	1	5	1	3	1	1.20	1.38

ECA TASK SCORE DESCRIPTION = 2.2

ECA TASK SCORE NO DESCRIPTION = 1.7

ECA TASK SCORE OVERALL (OSUT) = 2.1

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM				X		1	20	10
NO PROBLEM	X	X	X		X	4	80	90

	OSUT1	OSUT2	GROUP EFMD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFMD %
PROBLEM						0	0	7
NO PROBLEM	X	X	X	X	X	5	100	93

STOW M220 ENCASED MISSILES IN A MISSILE STORAGE RACK

TOE UNIT SOLDIERS

	DESCRIPTION			NO DESCRIPTION			OVERALL AVERAGE
	L 1	L 2	AVERAGE	L 3	L 4	AVERAGE	
PP	1	5	1.00	5	3	3.00	2.00
TPD	1	1	1.00	2	2	2.00	1.50
FR	3	5	3.00	3	3	3.00	3.00
TLD	1	1	1.00	2	1	1.50	1.25
TT	1	1	1.00	1	2	1.50	1.25
DR	1	1	1.00	2	2	2.00	1.50

ECA TASK SCORE<sub>DESCRIPTION</sub> = 3.0

ECA TASK SCORE<sub>NO DESCRIPTION</sub> = 81.0

ECA TASK SCORE<sub>OVERALL (UNIT)</sub> = 21.1

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	DESCRIPTION				NO DESCRIPTION				OVERALL TOTAL	OVERALL %
	L 1	L 2	TOTAL	%	L 3	L 4	TOTAL	%		
PROBLEM	X	X	2	100			0	0	2	50
NOT PROBLEM			0	0	X	X	2	100	2	50

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.

STOW M220 ENCASED MISSILES IN A MISSILE STORAGE RACK

INSTRUCTORS

	DESCRIPTION					NO DESCRIPTION					OVERALL AVERAGE
	IN 1	IN 2	IN 3	IN 4	AVERAGE	IN 5	IN 6	IN 7	IN 8	AVERAGE	
PP	4	4	1	4	3.25	3	1	4	1	2.25	2.75
TPD	1	1	1	1	1.00	1	2	1	1	1.25	1.12
FR	1	1	2	2	1.50	3	3	4	5	3.33	2.29
TLD	1	1	1	1	1.00	1	3	1	1	2.25	1.62
TT	1	1	1	1	1.00	1	1	1	1	1.00	1.00
DR	1	1	1	1	1.00	3	1	1	2	1.75	1.37

ECA TASK SCORE DESCRIPTION = 4.9

ECA TASK SCORE NO DESCRIPTION = 36.9

ECA TASK SCORE OVERALL (IN) = 15.8

	DESCRIPTION					NO DESCRIPTION					OVERALL %
	IN 1	IN 2	IN 3	IN 4	%	IN 5	IN 6	IN 7	IN 8	%	
PROBLEM					0					0	0
NOT PROBLEM	X	X	X	X	100	X	X	X	X	100	100

ARMY OCCUPATIONAL SURVEY PROGRAM (AOSP) DATA: None available.



STOW M220 ENCASED MISSILES IN A MISSILE STORAGE RACK

ONE-STATION UNIT TRAINING (OSUT) SOLDIERS

	OSUT1	OSUT2	GROUP ED OSUT3	OSUT4	OSUT5	AVERAGE
TPD	2	1	1	1	1	1.20
TLD	1	1	1	1	1	1.00
TT	1	1	1	1	1	1.00

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED & EFD AVERAGE
TPD	1	1	1	1	1	1.00	1.10
TLD	1	1	1	1	1	1.00	1.00
TT	1	3	1	1	1	1.40	1.20

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	AVERAGE	GROUPS ED, EFD, EFND AVERAGE
TPD	1	1	1	1	1	1.00	1.07
TLD	1	1	1	1	1	1.00	1.00
TT	1	1	1	1	1	1.00	1.13

ECA TASK SCORE DESCRIPTION = 1.3

ECA TASK SCORE NO DESCRIPTION = 1.0

ECA TASK SCORE OVERALL (OSUT) = 1.2

	OSUT1	OSUT2	GROUP FD OSUT3	OSUT4	OSUT5	TOTAL	%
PROBLEM						0	0
NO PROBLEM	X	X	X	X	X	5	100

	OSUT1	OSUT2	GROUP EFD OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS FD & EFD %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

	OSUT1	OSUT2	GROUP EFND OSUT3	OSUT4	OSUT5	TOTAL	%	GROUPS TD, EFD, EFND %
PROBLEM						0	0	0
NO PROBLEM	X	X	X	X	X	5	100	100

## APPENDIX J

### RANK-ORDERED TASK RATINGS

#### TOE Unit Soldiers (Overall)

ECA SCORE	TASK
173.3	Conduct mounting of M220 launcher system on an M901 vehicle.
166.6	Conduct dismounting of an M220 launcher system for an M901 vehicle.
150.7	Maintain the turret on an M901 vehicle.
139.3	Maintain the engine on an M113-series vehicle.
132.6	Engage a target.
114.6	Send a radio message.
102.5	Maintain intercommunications set AN/VIC-1 on a tracked vehicle.
97.5	Perform misfire/hangfire procedures (ITV).
96.2	Maintain the personnel heater on an M113-series vehicle.
88.4	Maintain the track and suspension system on an M113-series vehicle.
81.2	Load a dual launcher while mounted on an M901 vehicle.
81.2	Engage targets with an M220 launcher system while mounted on an M901 vehicle.
74.0	Conduct placement of a dismounted M220 launcher system into action.
70.4	Operate the turret on an M901 vehicle.
68.3	Prepare radio set AN/VRC-64 or AN/GRC-160 for operation.
64.6	Drive an M113-series vehicle.
55.7	Engage targets with an M220 launcher system.
55.5	Reload TOW launcher (ITV).
52.7	Perform emergency action procedures (ITV).
52.6	Supervise zeroing of organic weapons.
50.8	Perform a preoperational inspection of an M220 launcher system and encased missile.
45.1	Maintain an M220 launcher system.
44.8	Prepare radio set AN/PRC-77 or AN/PRC-25 for operation.
42.6	Maintain the brake system on an M113-series vehicle.
33.2	Operate the squad leaders periscope on an M901 vehicle.
32.2	Perform a system self-test on an M220 A2 launcher system.
30.2	Maintain the hydraulic system on an M113-series vehicle.
29.3	Operate the IC set AN/VIC-1 on a tracked vehicle.
28.7	Perform emergency evacuation from the ITV.
28.6	Operate radio set AN/VRC-64 or AN/GRC-160.
27.1	Unload a dual launcher while mounted on an M901 vehicle.
25.1	Destroy supplies and equipment.
24.7	Load an M220 launcher.
22.2	Charge a battery using a PP-7382/TAS Battery Charger.
21.1	Decontaminate equipment using NBC M-11 decontamination apparatus.
21.1	Stow M220 encased missiles in a missile storage rack.
20.5	Supervise towing of a vehicle.
20.1	Maintain the transmission system on an M113-series vehicle.
20.1	Maintain the exhaust system on an M113-series vehicle.
16.7	Maintain the electrical system on an M113-series vehicle.

## RANK-ORDERED TASK RATINGS (CON'T)

TOE Unit Soldiers (Overall)

ECA SCORE	TASK
15.4	Maintains the fuel system on an M113-series vehicle.
15.0	Operate the M-19 periscope on an M113-series vehicle.
15.0	Maintain the air cleaner system on an M113-series vehicle.
14.4	Maintain the steering system on an M113-series vehicle.
14.1	Maintain the hull on an M113-series vehicle.
14.1	Maintain the bilge system on an M113-series vehicle.
13.8	Maintain the Fire suppression system on an M113-series vehicle.
13.5	Tow a tracked vehicle.
13.3	Unload an M220 launcher.
12.9	Maintain the cooling system on an M113-series vehicle.
11.5	Mount an M-60 machinegun on a vehicle.
11.4	Perform immediate action for an M220 launcher system misfire.
11.3	Perform operators PMCS on an AN/VRC-12 series radio.
11.2	Dismount an M-60 machine gun from a vehicle.
11.0	Collimate an AN/TAS-4 series night sight to an M220 launcher optical sight.
9.4	Start an M113-series vehicle using auxiliary power.
7.9	Perform misfire procedures on an M243 smoke grenade launcher.
6.2	Maintain an M243 or M259 smoke grenade launcher.
5.0	Unload and M243 or M259 smoke grenade launcher.
4.0	Fire an M243 or M259 smoke grenade launcher.
3.3	Load an M243 or M259 smoke grenade launcher.

# RANK-ORDERED ECA TASK RATINGS (CON'T)

## TOE Unit Soldiers (Descriptions)

ECA SCORE	TASK
175.0	Maintain the turret on an M901 vehicle.
157.5	Conduct mounting of an M220 launcher system for an M901 vehicle.
144.0	Send a radio message.
140.6	Conduct dismounting of an M220 launcher system for an M901 vehicle.
135.0	Maintain intercommunications set AN/VIC-1 on a tracked vehicle.
112.5	Perform misfire/hangfire procedures (ITV).
94.5	Engage a target.
93.8	Operate the squad leader's periscope on an M901 vehicle.
87.9	Engage targets with an M220 launcher system while mounted on an M901 vehicle.
67.5	Maintain the engine on an M113-series vehicle.
64.0	Prepare radio set AN/VRC-64 or AN/GRC-160 for operation.
59.1	Perform a preoperational inspection of an M220 launcher system and encased missile.
50.6	Perform emergency action procedures (ITV).
50.6	Perform a system self-test on an M220A2 launcher system.
39.4	Maintain the brake system on an M113-series vehicle.
37.5	Load a dual launcher while mounted on an M901 vehicle.
36.0	Conduct placement of a dismounted M220 launcher system into action.
35.4	Prepare radio set AN/PRC-77 or AN/PRC-25 for operation.
33.8	Engage targets with an M220 launcher system.
30.4	Operate the turret on an M901 vehicle.
30.0	Maintain an M220 launcher system.
28.1	Reload TOW launcher (ITV).
27.0	Maintain the track and suspension system on an M113-series vehicle.
22.5	Charge a battery using a PP-7382/TAS battery charger.
16.0	Operate intercommunications set AN/VIC-1 on a tracked vehicle.
16.0	Operate radio set AN/VRC-64 or AN/GRC-160.
15.2	Maintain the personnel heater on an M113-series vehicle.
14.1	Supervise towing of a vehicle.
12.5	Supervise zeroing of organic weapons.
12.0	Perform operator's PMCS on AN/VRC-12 series radio.
11.3	Destroy supplies and equipment.
11.3	Dismount an M60 machinegun from a vehicle.
10.0	Collimate an AN/TAS-4 series night sight to an M220 launcher system optical sight.
8.4	Unload a dual launcher while mounted on an M901 vehicle.
7.5	Perform emergency evacuation from the ITV.
7.5	Decontaminate equipment using NBC M11 decontaminating apparatus.
7.5	Mount an M60 machine gun on a vehicle.
7.0	Maintain the bilge system on an M113-series vehicle.
6.8	Maintain the fuel system on an M113-series vehicle.
6.8	Maintain the air cleaner system on an M113-series vehicle.

# RANK-ORDERED ECA TASK RATINGS (CON'T)

## TOE Unit Soldiers (Descriptions)

ECA SCORE	TASK
6.8	Maintain the hull on an M113-series vehicle.
6.0	Maintain the fire suppression system on an M113-series vehicle.
6.0	Perform immediate action for an M220 launcher system misfire.
5.3	Maintain the hydraulic system on an M113-series vehicle.
5.3	Maintain the exhaust system on an M113-series vehicle.
5.3	Maintain the steering system on an M113-series vehicle.
5.3	Maintain the cooling system on an M113-series vehicle.
5.0	Operate the M19 periscope on an M113-series vehicle.
4.0	Maintain the electrical system on an M113-series vehicle.
3.8	Load an M220 launcher.
3.5	Drive an M113-series vehicle.
3.0	Stow M220 encased missiles in a missile storage rack.
3.0	Maintain the transmission system on an M113-series vehicle.
3.0	Unload an M220 launcher.
3.0	Load an M243 or M259 smoke grenade launcher.
2.5	Start an M113-series vehicle using auxiliary power.
2.5	Maintain an M243 or M259 smoke grenade launcher.
2.0	Perform misfire procedures on an M243 smoke grenade launcher.
2.0	Unload an M243 or M259 smoke grenade launcher.
2.0	Fire an M243 or M259 smoke grenade launcher.
1.0	Tow a tracked vehicle.

# RANK-ORDERED ECA TASK RATINGS (CON'T)

## TOE Unit Soldiers (No Descriptions)

ECA SCORE	TASK
1152.0	Maintain the personnel header on an M113-series vehicle.
400.0	Drive an M113-series vehicle.
240.0	Maintain the engine on an M113-series vehicle.
192.0	Maintain the track and suspension system on an M113-series vehicle.
183.8	Conduct mounting of an M220 launcher system on an M901 vehicle.
183.8	Conduct dismounting of an M220 launcher system from an M901 vehicle.
175.0	Engage a target.
157.5	Supervise zeroing of organic weapons.
131.3	Conduct placement of a dismounted M220 launcher system into action.
131.3	Operate the turret on an M901 vehicle.
128.0	Maintain the exhaust system on an M113-series vehicle.
118.1	Maintain the turret on an M901 vehicle.
117.2	Load a dual launcher while mounted on an M901 vehicle.
108.0	Maintain the hydraulic system on an M113-series vehicle.
98.4	Reload TOW launcher (ITV).
84.0	Send a radio message.
81.0	Stow M220 encased missiles in a missile storage rack.
78.8	Maintain intercommunications set AN/VIC-1 on a tracked vehicle.
78.8	Perform misfire/hangfire procedures (ITV).
75.9	Engage targets with an M220 launcher system while mounted on an M901 vehicle.
70.3	Perform emergency evacuation from the ITV.
70.3	Load an M220 launcher.
67.5	Engage targets with an M220 launcher system.
67.5	Unload a dual launcher while mounted on an M901 vehicle.
64.0	Prepare radio set AN/VRC-64 or AN/GRC-160 for operation.
55.1	Prepare radio set AN/PRC-77 or AN/PRC-25 for operation.
54.0	Maintain an M220 launcher system.
54.0	Maintain the transmission system on an M113-series vehicle.
50.0	Decontaminate equipment using NBC M11 decontaminating apparatus.
47.3	Maintain the brake system on an M113-series vehicle.
47.3	Operate intercommunications set AN/VIC-1 on a tracked vehicle.
45.0	Perform emergency action procedures (ITV).
43.8	Destroy supplies and equipment.
40.5	Perform a preoperational inspection of an M220 launcher system and encased missile.
33.8	Unload an M220 launcher.
29.5	Maintain the steering system on an M113-series vehicle.
26.3	Supervise towing of a vehicle.
24.0	Maintain the fuel system on an M113-series vehicle.
24.0	Maintain the air cleaner system on an M113-series vehicle.
24.0	Maintain the bilge system on an M113-series vehicle.

# RANK-ORDERED ECA TASK RATINGS (CON'T)

## TOE Unit Soldiers (No Descriptions)

ECA SCORE	TASK
24.0	Tow a tracked vehicle.
24.0	Maintain the cooling system on an M113-series vehicle.
22.5	Maintain the electrical system on an M113-series vehicle.
22.3	Charge a battery using a PP-7382/TAS battery charger.
21.1	Maintain the hull on an M113-series vehicle.
21.0	Start an M113-series vehicle using auxiliary power.
19.7	Perform immediate action for an M220 launcher system misfire.
18.4	Maintain the fire suppression system on an M113-series vehicle.
18.0	Perform a system self-test on an M220A2 launcher system.
13.5	Perform misfire procedures on an M243 smoke grenade launcher.
13.5	Unload an M243 or M259 smoke grenade launcher.
13.1	Operate radio set AN/VRC-64 or AN/GRC-160.
12.0	Mount an M60 machinegun on a vehicle.
12.0	Collimate an AN/TAS-4 series night sight to an M220 launcher system optical sight.
10.5	Dismount an M60 machinegun from a vehicle.
9.0	Operate the squad leader's periscope on an M901 vehicle.
8.0	Perform operator's PMCS on AN/VRC-12 series radio.
8.0	Fire an M243 or M259 smoke grenade launcher.
4.5	Maintain an M243 or M259 smoke grenade launcher.
3.0	Load an M243 or M259 smoke grenade launcher.
0.0	Operate the M19 periscope on an M113-series vehicle.

# RANK-ORDERED ECA TASK RATINGS (CON'T)

## Instructors (Overall)

ECA SCORE	TASK
355.1	Operate the turret on an M901 vehicle.
300.8	Conduct dismounting of an M220 launcher system for an M901 vehicle.
274.7	Conduct mounting of an M220 launcher system on an M901 vehicle.
240.0	Maintain the engine on an M113-series vehicle.
204.7	Maintain the track and suspension system on an M113-series vehicle.
164.3	Maintain the turret on an M901 vehicle.
138.5	Maintain the brake system on an M113-series vehicle.
132.1	Conduct placement of a dismounted M220 launcher system into action.
126.2	Drive an M113-series vehicle.
101.4	Collimate an AN/TAS-4 Series night sight to an M220 launcher system optical sight.
98.1	Maintain the hull on an M113-series vehicle.
95.6	Reload TOW launcher (ITV).
89.3	Perform misfire/hangfire procedures (ITV).
86.3	Perform system self-test on an M220 A2 launcher system.
78.1	Maintain the transmission system on an M113-series vehicle.
61.3	Maintain the hydraulic system on an M113-series vehicle.
60.3	Maintain the personnel heater on a M113-series vehicle.
55.2	Maintain the electrical system on an M113-series vehicle.
52.7	Supervise zeroing of organic weapons.
50.4	Maintain the exhaust system on an M113-series vehicle.
49.5	Maintain the steering system on an M113-series vehicle.
48.5	Maintain an M220 launcher system.
47.5	Load a dual launcher while mounted on an M901 vehicle.
47.3	Operate the M19 periscope on an M113-series vehicle.
43.3	Unload a dual launcher while mounted on an M901 vehicle.
41.4	Perform a preoperational inspection of an M220 launcher system and encased missile.
40.6	Maintain intercommunications set AN/VIC-1 on a tracked vehicle.
40.5	Engage a target.
39.7	Tow a tracked vehicle.
38.9	Engage targets with an M220 launcher system while mounted on an M901 vehicle.
36.2	Maintain the bilge system on an M113-series vehicle.
36.1	Maintain the fire suppression system on an M113-series vehicle.
36.0	Unload an M220 launcher.
36.0	Engage targets with an M220 launcher system.
35.7	Maintain the fuel system on an M113-series vehicle.
33.2	Decontaminate equipment using NBC M11 decontaminating apparatus.
31.6	Perform immediate action for an M220 launcher system misfire.
30.7	Load an M220 launcher.
28.7	Maintain the cooling system on an M113-series vehicle.
28.0	Perform emergency action procedures (ITV).



# RANK-ORDERED ECA TASK RATINGS (CON'T)

## Instructors (Overall)

ECA SCORE	TASK
27.4	Operate radio set AN/VRC-64 or AN/GRC-160.
27.1	Maintain the air cleaner system on an M113-series vehicle.
23.3	Operate the squad leader's periscope on an M901 vehicle.
20.3	Supervise towing of a vehicle.
19.0	Prepare radio set AN/VRC-64 or AN/GRC-160 for operations.
18.8	Perform operation PMCS on AN-VRC-12 series radio.
18.6	Operate intercommunications set AN/VIC-1 on a tracked vehicle.
15.8	Stow M220 encased missiles in a missile stowage rack.
15.6	Charge a battery using a PP-7382/TAS battery charger.
13.9	Send a radio message.
13.8	Prepare a radio set AN/PRC-77 or AN/PRC-25 for operation.
12.2	Dismount an M60 machine gun from a vehicle.
11.8	Perform emergency evacuation from the ITV.
11.7	Start an M113-series vehicle using auxiliary power.
11.5	Maintain an M243 or M259 smoke grenade launcher.
11.3	Mount an M60 machinegun on a vehicle.
10.4	Load an M243 or M259 smoke grenade launcher.
10.4	Perform misfire procedures on an M243 grenade launcher.
10.3	Unload an M243 or M259 smoke grenade launcher.
8.0	Destroy supplies and equipment.
4.4	Fire an M243 or M259 smoke grenade launcher.

# RANK-ORDERED ECA TASK RATINGS (CON'T)

## Instructors (Descriptions)

ECA SCORE	TASK
290.0	Maintain the engine on an M113-series vehicle.
241.3	Operate the turret on an M901 vehicle.
228.5	Conduct mounting of an M220 launcher system on an M901 vehicle.
228.5	Conduct dismounting of an M220 launcher system from an M901 vehicle.
144.0	Maintain the track and suspension system on an M113-series vehicle.
141.2	Maintain the brake system on an M113-series vehicle.
137.8	Collimate an AN/TAS-4 series night sight to an M220 launcher system optical sight.
115.8	Maintain the turret on an M901 vehicle.
98.4	Conduct placement of a dismounted M220 launcher system into action.
76.6	Drive an M113-series vehicle.
51.7	Perform a system self-test on an M220A2 launcher system.
48.1	Perform misfire/hangfire procedures (ITV).
47.3	Supervise zeroing of organic weapons.
44.2	Maintain the personnel heater on an M113-series vehicle.
39.5	Reload TOW launcher (ITV).
37.0	Maintain the electrical system on an M113-series vehicle.
34.8	Maintain the hull on an M113-series vehicle.
33.2	Decontaminate equipment using NBC M11 decontaminating apparatus.
32.3	Tow a tracked vehicle.
31.6	Maintain the transmission system on an M113-series vehicle.
26.7	Maintain an M220 launcher system.
25.8	Maintain the bilge system on an M113-series vehicle.
25.6	Maintain the exhaust system on an M113-series vehicle.
23.1	Load a dual launcher while mounted on an M901 vehicle.
22.0	Unload a dual launcher while mounted on an M901 vehicle.
21.3	Maintain the fuel system on an M113-series vehicle.
19.8	Maintain the steering system on an M113-series vehicle.
18.8	Maintain the cooling system on an M113-series vehicle.
18.5	Unload an M220 launcher.
17.8	Perform a preoperational inspection of an M220 launcher system and encased missile.
17.2	Supervise towing of a vehicle.
16.9	Engage targets with an M220 launcher system while mounted on an M901 vehicle.
16.7	Engage targets with an M220 launcher system.
16.0	Perform emergency action procedures (ITV).
15.0	Maintain the fire suppression system on an M113-series vehicle.
14.6	Maintain intercommunications set AN/VIC-1 on a tracked vehicle.
13.0	Prepare radio set AN/VRC-64 or AN/GRC-160 for operation.
12.3	Operate radio set AN/VRC-64 or AN/GRC-160.
12.0	Maintain the hydraulic system on an M113-series vehicle.
11.8	Operate the M19 periscope on an M113-series vehicle.

# RANK-ORDERED ECA TASK RATINGS (CON'T)

## Instructors (Descriptions)

ECA SCORE	TASK
10.3	Maintain the air cleaner system on an M113-series vehicle.
10.2	Perform immediate action for an M220 launcher system misfire.
9.6	Prepare radio set AN/PRC-77 or AN/PRC-25 for operation.
9.2	Operate intercommunications set AN/VIC-1 on a tracked vehicle.
9.1	Load an M220 launcher.
9.0	Destroy supplies and equipment.
8.6	Engage a target.
8.4	Perform operator's PMCS on AN/VRC-12 series radio.
7.5	Operate the squad leader's periscope on an M901 vehicle.
7.3	Maintain an M243 or M259 smoke grenade launcher.
6.9	Charge a battery using a PP-7382/TAS battery charger.
6.9	Send a radio message.
6.8	Load an M243 or M259 smoke grenade launcher.
6.8	Unload an M243 or M259 smoke grenade launcher.
5.7	Dismount an M60 machinegun from a vehicle.
5.7	Perform emergency evacuation from the ITV.
5.7	Mount an M60 machinegun on a vehicle.
4.9	Stow M220 encased missiles in a missile storage rack.
4.7	Perform misfire procedures on an M243 smoke grenade launcher.
4.4	Start an M113-series vehicle using auxiliary power.
2.8	Fire an M243 or M259 smoke grenade launcher.

# RANK-ORDERED ECA TASK RATINGS (CON'T)

## Instructors (No Descriptions)

ECA SCORE	TASK
502.7	Operate the turret on an M901 vehicle.
357.5	Conduct dismounting of an M220 launcher system from an M901 vehicle.
321.8	Conduct mounting of an M220 launcher system on an M901 vehicle.
262.5	Maintain the hydraulic system on an M113-series vehicle.
250.7	Maintain the track and suspension system on an M113-series vehicle.
206.3	Maintain the turret on an M901 vehicle.
205.3	Reload TOW launcher (ITV).
189.6	Maintain the transmission system on an M113-series vehicle.
189.5	Maintain the engine on an M113-series vehicle.
189.0	Drive an M113-series vehicle.
179.7	Operate the M19 periscope on an M113-series vehicle.
173.3	Maintain the hull on an M113-series vehicle.
168.8	Conduct placement of a dismounted M220 launcher system into action.
157.5	Perform misfire/hangfire procedures (ITV).
137.8	Engage a target.
136.1	Maintain the brake system on an M113-series vehicle.
117.0	Perform a system self-test on an M220A2 launcher system.
99.6	Maintain the exhaust system on an M113-series vehicle.
99.6	Maintain the steering system on an M113-series vehicle.
88.6	Maintain intercommunications set AN/VIC-1 on a tracked vehicle.
85.1	Perform a preoperational inspection of an M220 launcher system and encased vehicle.
84.4	Load a dual launcher while mounted on an M901 vehicle.
79.4	Maintain the fire suppression system on an M113-series vehicle.
79.1	Maintain an M220 launcher system.
74.3	Maintain the personnel heater on an M113-series vehicle.
73.8	Perform immediate action for an M220 launcher system misfire.
73.1	Load an M220 launcher.
72.2	Engage targets with an M220 launcher system while mounted on an M901 vehicle.
69.6	Collimate an AN/TAS-4 series night sight to an M220 launcher system optical sight.
67.5	Unload a dual launcher while mounted on an M901 vehicle.
67.5	Engage targets with an M220 launcher system.
67.2	Maintain the electrical system on an M113-series vehicle.
64.5	Maintain the fuel system on an M113-series vehicle.
60.9	Unload an M220 launcher.
57.0	Operate the squad leader's periscope on an M901 vehicle.
55.0	Operate radio set AN/VRC-64 or AN/GRC-160.
53.2	Maintain the air cleaner system on an M113-series vehicle.
51.2	Supervise zeroing of organic weapons.
50.8	Maintain the bilge system on an M113-series vehicle.
47.3	Tow a tracked vehicle.

# RANK-ORDERED ECA TASK RATINGS (CON'T)

## Instructors (No Descriptions)

ECA SCORE	TASK
40.8	Perform emergency action procedures (ITV)
38.7	Maintain the cooling system on an M113-series vehicle.
36.9	Stow M220 encased missiles in a missile storage rack.
33.8	Operate intercommunications set AN/VIC-1 on a tracked vehicle.
32.0	Start an M113-series vehicle using auxiliary power.
30.6	Decontaminate equipment using NBC M11 decontaminating apparatus.
30.1	Charge a battery using a PP-7382/TAS battery charger.
27.7	Perform operator's PMCS on AN/VRC-12 series radio.
26.3	Prepare radio set AN/VRC-64 or AN/GRC-160 for operation.
23.4	Supervise towing of a vehicle.
22.5	Dismount an M60 machinegun from a vehicle.
21.9	Send a radio message.
20.5	Perform emergency evacuation from the ITV.
19.3	Mount an M60 machinegun on a vehicle.
18.8	Prepare radio set AN/PRC-77 or AN/PRC-25 for operation.
18.4	Perform misfire procedures on an M243 smoke grenade launcher.
16.0	Maintain an M243 or M259 smoke grenade launcher.
15.3	Load an M243 or M259 smoke grenade launcher.
15.3	Unload an M243 or M259 smoke grenade launcher.
6.8	Destroy supplies and equipment.
6.3	Fire an M243 or M259 smoke grenade launcher.

# RANK-ORDERED ECA TASK RATINGS (CON'T)

## OSUT Soldiers (Overall)

ECA SCORE	TASK
6.9	Operate the turret on an M901 vehicle.
5.0	Maintain the turret on an M901 vehicle.
4.7	Conduct mounting of M220 launcher system on an M901 vehicle.
4.1	Operate intercommunications set AN/VIC-1 on a tracked vehicle.
3.9	Conduct dismounting of an M220 launcher system for an M901 vehicle.
3.2	Perform emergency evacuation from the ITV.
2.8	Perform emergency action procedures (ITV).
2.8	Engage targets with an M220 launcher system while mounted on an M901 vehicle.
2.8	Perform a preoperational inspection of an M220 launcher system and encased missile.
2.7	Collimate an AN/TAS-4 series night sight to an M220 launcher optical sight.
2.7	Reload TOW launcher (ITV).
2.6	Maintain an M220 launcher system.
2.6	Perform a system self-test on an M220 A2 launcher system.
2.6	Conduct placement of a dismounted M220 launcher system into action.
2.4	Load a dual launcher while mounted on an M901 vehicle.
2.4	Engage targets with an M220 launcher system.
2.1	Unload a dual launcher while mounted on an M901 vehicle.
1.8	Load an M220 launcher.
1.8	Send a radio message.
1.6	Prepare radio set AN/PRC-77 or AN/PRC-25 for operation.
1.5	Engage a target.
1.5	Load an M243 or M259 smoke grenade launcher.
1.4	Unload and M243 or M259 smoke grenade launcher.
1.4	Unload an M220 launcher.
1.3	Destroy supplies and equipment.
1.3	Maintain an M243 or M259 smoke grenade launcher.
1.3	Operate the squad leaders periscope on an M901 vehicle.
1.2	Perform misfire procedures on an M243 smoke grenade launcher.
1.2	Perform immediate action for an M220 launcher system misfire.
1.2	Perform misfire/hangfire procedures (ITV).
1.2	Mount an M-60 machinegun on a vehicle.
1.2	Stow M220 encased missiles in a missile storage rack.
1.0	Dismount an M-60 machine gun from a vehicle.
1.0	Fire an M243 or M259 smoke grenade launcher.

# RANK-ORDERED ECA TASK RATINGS (CON'T)

## OSUT Soldiers (Descriptions)

ECA SCORE	TASK
6.8	Operate the turret on an M901 vehicle.
5.4	Maintain the turret on an M901 vehicle.
4.5	Conduct mounting of an M220 launcher system on an M901 vehicle.
3.5	Engage targets with an M220 launcher system.
3.2	Perform a preoperational inspection of an M220 launcher system and encased missile.
3.1	Engage targets with an M220 launcher system while mounted on an M901 vehicle.
3.1	Conduct dismounting of an M220 launcher system from an M901 vehicle.
2.8	Perform emergency action procedures (ITV).
2.7	Maintain an M220 launcher system.
2.3	Collimate an AN/TAS-4 series night sight to an M220 launcher system optical sight.
2.2	Unload a dual launcher while mounted on an M901 vehicle.
2.2	Reload TOW launcher (ITV).
2.1	Load a dual launcher while mounted on an M901 vehicle.
2.1	Perform a system self-test on an M220A2 launcher system.
2.1	Send a radio message.
2.0	Conduct placement of a dismounted M220 launcher system into action.
2.0	Perform emergency evacuation from the ITV.
1.9	Load an M220 launcher.
1.8	Operate intercommunications set AN/VIC-1 on a tracked vehicle.
1.6	Prepare radio set AN/PRC-77 or AN/PRC-25 for operation.
1.5	Unload an M220 launcher.
1.5	Load an M243 or M259 smoke grenade launcher.
1.4	Unload an M243 or M259 smoke grenade launcher.
1.3	Stow M220 encased missiles in a missile storage rack.
1.3	Maintain an M243 or M259 smoke grenade launcher.
1.3	Mount an M60 machinegun on a vehicle.
1.3	Engage a target.
1.3	Operate the squad leader's periscope on an M901 vehicle.
1.3	Destroy supplies and equipment.
1.2	Perform misfire/hangfire procedures (ITV).
1.1	Perform immediate action for an M220 launcher system misfire.
1.0	Perform misfire procedures on an M243 smoke grenade launcher.
1.0	Dismount an M60 machinegun from a vehicle.
1.0	Fire an M243 or M259 smoke grenade launcher.

# RANK-ORDERED ECA TASK RATINGS (CON'T)

## OSUT Soldiers (No Descriptions)

ECA SCORE	TASK
15.0	Operate intercommunications set AN/VIC-1 on a tracked vehicle.
6.8	Operate the turret on an M901 vehicle.
6.6	Perform emergency evacuation from the ITV.
6.5	Maintain the turret on an M901 vehicle.
5.8	Conduct dismounting of an M220 launcher system from an M901 vehicle.
5.0	Conduct mounting of an M220 launcher system on an M901 vehicle.
4.2	Perform a system self-test on an M220A2 launcher system.
4.2	Maintain an M220 launcher system.
4.1	Conduct placement of a dismounted M220 launcher system into action.
3.8	Collimate an AN/TAS-4 series night sight to an M220 launcher system optical sight.
3.8	Reload TOW launcher (ITV).
2.9	Load a dual launcher while mounted on an M901 vehicle.
2.7	Perform emergency action procedures (ITV).
2.0	Engage targets with an M220 launcher system while mounted on an M901 vehicle.
1.9	Perform a preoperational inspection of an M220 launcher system and encased missile.
1.8	Perform misfire procedures on an M243 smoke grenade launcher.
1.7	Unload a dual launcher while mounted on an M901 vehicle.
1.7	Load an M220 launcher.
1.7	Engage targets with an M220 launcher system.
1.5	Prepare radio set AN/PRC-77 or AN/PRC-25 for operation.
1.5	Send a radio message.
1.4	Perform immediate action for an M220 launcher system misfire.
1.4	Engage a target.
1.3	Maintain an M243 or M259 smoke grenade launcher.
1.3	Unload an M243 or M259 smoke grenade launcher.
1.3	Load an M243 or M259 smoke grenade launcher.
1.3	Destroy supplies and equipment.
1.2	Unload an M220 launcher.
1.2	Perform misfire/hangfire procedures (ITV).
1.2	Operate the squad leader's periscope on an M901 vehicle.
1.0	Stow M220 encased missiles in a missile storage rack.
1.0	Dismount an M60 machinegun from a vehicle.
1.0	Mount an M60 machinegun on a vehicle.
1.0	Fire an M243 or M259 smoke grenade launcher.



## APPENDIX K

### TASK AND LEARNING ANALYSES

MOS: 11H

TASK NUMBER: 071-056-0041

TASK TITLE: Conduct Mounting of an M220 Launcher System on an M901 Vehicle

#### PERFORMANCE STEPS:

NOTE: Specific duties, (outlined in FM 23-34, chapter 7, table 7-4 and 7-6) should be assigned to each squad member so that accomplishment of this task is achieved with maximum efficiency.

1. Give command to mount the launcher system.
2. Supervise, assist, and make on-the-spot corrections so that the following is accomplished:
  - a. All vehicle and launcher system safety precautions are complied with.
  - b. Missile guidance set (MGS) secured in operational location for turret use with vehicle power conditioner (VPC) installed.
  - c. Coil cable is connected to MGS.
  - d. Power conditioner cable is connected to VPC.
  - e. Optical sight is installed on mounting plate.
  - f. Nightsight is installed on optical sight.
  - g. VPC cable and actuators are connected to nightsight.
  - h. M901A1/M220A2 equipped: Boresight collimator cable and post-amplifier cable is connected to nightsight.
  - i. Traversing unit, launch tube, tripod, (nightsight battery case and coolant cartridge case when equipped with M901/M220A1--battery power conditioner when equipped with M901A1/M220A2), and collimator are stowed and secured in designated location.
  - j. Encased missiles stowed in missile storage rack.
  - k. Self-test portion of the system checkout procedure is completed and the launcher system is operational.

**EQUIPMENT USED WITH/TO PERFORM TASKS:**

1. M901 vehicle
2. M220 launcher system
3. Encased missiles

**CONDITIONS:**

Given an M901 vehicle, M220 antiarmor squad, M220 launcher system, encased missiles, and a requirement to mount the system on the M901 vehicle.

**STANDARDS:**

Supervision, assistance, and on the spot corrections have been applied so that:

1. The launcher system is mounted on the M901 vehicle and is operational.
2. Components and encased missiles have been placed and secured in their designated location.

**REQUIRED KNOWLEDGE, SKILLS, AND ABILITIES:**

1. Knowledge:
  - a. Know how to apply supervision techniques.
  - b. Know the assigned duties of each squad member.
  - c. Know the procedures for mounting launcher system on M901.
  - d. Know the safety precautions that apply to vehicle and launcher system.
2. Skills:
  - a. Cognitive: procedural.
  - b. Psychomotor: Gross motor skills; positioning movements; fine alignment.
3. Abilities:
  - a. Ability to apply supervision techniques.

### DEFICIENCIES:

1. Manpower: Crew shortages and turbulence have been raised as potential problems for ITV crews (e.g., Hammond & Redden, 1984; Hammond, 1985). Crew shortages and turbulence also were noted informally as problems during the current research. However, there is no suggestion that these problems exist based on available MOS 11H fiscal year (FY) 88 year end force structure data (Table K-1).
2. Personnel: No personnel deficiencies were noted. Current Armywide quality goals for this MOS are being met.
3. Training: No training deficiencies were noted, although deficiencies in unit training are probable given crew shortages and turbulence. This task is introduced during the 11H OSUT program of instruction as part of the "Ground TOW Crew Drill." Each soldier is trained and tested on this task in each crew position. (Currently, ITV OSUT soldiers receive approximately 12 hours training and testing the mounting/dismounting of the M220 launcher.) Elements of the task also are included in the ITV Trainer course. The latter course provides approximately 80 hours of ITV operator/crew training covering basically the same tasks as OSUT covers. Comments of squad leaders suggest that this task is performed infrequently in the field. Instructors believe that mounting/dismounting the M220 launcher is difficult, but is critical and must be trained.

### SOLUTIONS FOR IDENTIFIED DEFICIENCIES:

In the event the M901 becomes disabled in combat, the crew can retain its armor killing capabilities by dismounting the TOW components and deploying the TOW in the ground-mount mode. Certain tactical situations also dictate that the M220 launcher be dismounted from the vehicle (e.g., city fighting, Air Mobile operations). Solutions for identified deficiencies lie in system design changes aimed at reducing the combined effects of a variety of factors. These factors include the weight of the equipment, the fragility of the equipment, the speed with which all the steps encompassed by this task must be performed, and the confined space in which the crew must operate.

**MOS: 11H**

**TASK NUMBER: 071-056-0045**

**TASK TITLE: Conduct Dismounting of an M220 Launcher System from an M901 Vehicle**

**PERFORMANCE STEPS:**

**NOTE:** Specific duties, (outlined in FM 23-34, chapter 6, table 7-3 and 7-5) should be assigned to each squad member so that accomplishment of this task is achieved with maximum efficiency.

1. Give command to dismount the launcher system.
2. Supervise, assist, and make on the spot corrections so that the following is accomplished:
  - a. All vehicle and launcher system safety precautions are complied with.
  - b. Vehicle is in a covered and concealed position with ramp lowered and engine off.
  - c. Missile guidance set (MGS) is removed from its mounting bracket and a battery assembly is installed.
  - d. Nightsight and optical sight are removed from launcher assembly.
  - e. Launch tube, traversing unit, tripod, (nightsight battery case and coolant cartridge case when equipped with M901/M220A1---battery power conditioner (BPC) when equipped with M901A1/M220A2), collimator, and encased missiles are removed from vehicle stowage area.
  - f. Nightsight is placed in its carrying case.
  - g. MGS cover is placed on the MGS and secured.
3. When all the equipment has been off loaded, have it set in position for movement to a ground firing site.

**EQUIPMENT USED WITH/TO PERFORM TASKS:**

1. M901 vehicle.
2. M220 launcher system.
3. Encased missiles.

### **CONDITIONS:**

Given an M220 antiarmor squad, M220 launcher system with encased missiles mounted on an M901 vehicle, and a requirement to dismount the system.

### **STANDARDS:**

Supervision, assistance, and on the spot corrections have been applied so that components and encased missiles have been removed from the vehicle without damage to equipment or injury to personnel.

### **REQUIRED KNOWLEDGE, SKILLS, AND ABILITIES:**

1. Knowledge:
  - a. Know how to apply supervision techniques.
  - b. Know the assigned duties of each squad member.
  - c. Know the procedures for dismounting launcher system from M901.
  - d. Know the safety precautions that apply to vehicle and launcher system.
2. Skills:
  - a. Cognitive: procedural.
  - b. Psychomotor: Gross motor skills; positioning movements; fine alignment.
3. Abilities:
  - a. Ability to apply supervision techniques.

### **DEFICIENCIES:**

1. Manpower: Crew shortages and turbulence have been raised as potential problems for ITV crews (e.g., Hammond & Redden, 1984; Hammond, 1985). Crew shortages and turbulence also were noted informally as problems during the current research. However, there is no suggestion that these problems exist based on available MOS 11H fiscal year (FY) 88 year end force structure data (Table K-1).
2. Personnel: No personnel deficiencies were noted. Current Armywide quality goals for this MOS are being met.

3. Training: No training deficiencies were noted, although deficiencies in unit training are probable given crew shortages and turbulence. This task is introduced during the 11H OSUT program of instruction as part of the "Ground TOW Crew Drill." Each soldier is trained and tested on this task in each crew position. (Currently, ITV OSUT soldiers receive approximately 12 hours training and testing the mounting/dismounting of the M220 launcher.) Elements of the task also are included in the ITV Trainer course. The latter course provides approximately 80 hours of ITV operator/crew training covering basically the same tasks as OSUT covers. Comments of Squad Leaders suggest that this task is performed infrequently in the field. Instructors believe that mounting/dismounting the M220 launcher is difficult, but is critical and must be trained.

#### SOLUTIONS FOR IDENTIFIED DEFICIENCIES:

In the event the M901 becomes disabled in combat, the crew can retain its armor killing capabilities by dismounting the TOW components and deploying the TOW in the ground-mount mode. Certain tactical situations also dictate that the M220 launcher be dismounted from the vehicle (e.g., city fighting, Air Mobile operations). Solutions for identified deficiencies lie in system design changes aimed at reducing the combined effects of a variety of factors. These factors include the weight of the equipment, the fragility of the equipment, the speed with which all the steps encompassed by the task must be performed, and the confined space in which the crew must operate.

MOS: 11H

TASK NUMBER: 071-214-0002

TASK TITLE: Operate the Turret on an M901 Vehicle

PERFORMANCE STEPS:

1. Ensure that the top deck is clear of personnel and loose objects.
2. Ensure M60 machine gun is in the stow position and the gunner's hatch is closed.
3. Check the gunner's control panel and ensure that the switches are set as follows:

Switch	Position
TURRET POWER	OFF
MODE SELECT	STOW
ERECTION DRIVE	OFF
EMER PWR	OFF
OVERRIDE	OFF
MISSILE SELECT	OFF
ARMED/SAFE	SAFE

4. Check with driver to ensure engine idle speed is at 1,200 to 1,500 rpm.
5. Apply turret power.
6. Manipulate switches and interpret indicators on gunner's control panel to test and adjust lights; to erect, load, and stow the launcher; and to select, arm, and/or safe missiles in the launcher as required by mission.
7. Use gunner's hand control assembly to select desired optics, track targets, fire selected missile, and identify trigger switch failure.
8. When use of the turret is no longer required, stow the launcher and set switches on gunner's control panel as shown in Step 3.

Warnings and cautions associated with this task are as follows:

1. Do not enter or exit the gunner's station with the turret power on. The turret can injure the soldier if it moves when the soldier is entering or exiting the gunner's station.
2. To avoid injury to personnel and damage to equipment, make sure hull deck is clear of personnel, loose

objects, and other obstructions prior to erecting launcher.

3. To avoid damaging the erection drive gear shaft teeth and bearings due to improper alignment, do not operate the erection drive with the left erection arm cover removed.
4. Do not operate gunner's hand controls unless both LAUNCHER ERECT and LAUNCHER READY INDICATORS on gunner's control panel are lit. Failure to observe this warning may cause launcher to fall resulting in serious injury to personnel and damage to equipment.
5. Do not turn off turret power with launcher erected unless hydraulic pressure is released.
6. Do not use the OVERRIDE switch to override a firing angle limitation unless justified by an extreme emergency.
7. Do not fire in the caution zone as this may cause damage to the engine and trim vane.

**EQUIPMENT USED WITH/TO PERFORM TASKS:**

M901 with basic issue items (BII).

**CONDITIONS:**

In a combat environment, given an operational M901 with BII, engine idling at 1,200 to 1,500 rpm, and a requirement to operate the turret.

**STANDARDS:**

Turret controls have been used to erect, load, and stow the launcher; to acquire targets; to arm, safe, or fire missiles; and to track targets without causing damage to the equipment or injury to personnel.

**REQUIRED KNOWLEDGE, SKILLS, AND ABILITIES:**

1. Knowledge:
  - a. Know identity, location, and function of switches on gunner's control panel and hand control assembly.
  - b. Know how to manipulate switches on gunner's control panel and hand control assembly.
  - c. Know operational sequence of switches on gunner's control panel and hand control assembly.



- d. Know condition of indicator lights.
- e. Know safety precautions.
- 2. Skills:
  - a. Cognitive: Following procedures, evaluating conditions, making decisions.
  - b. Psychomotor: Fine alignment/tracking.
  - c. Perceptual: Detecting signals.
- 3. Abilities:
  - a. Ability to manipulate switches on gunner's control panel and hand control assembly.
  - b. Ability to interpret indicator lights.
  - c. Ability to apply safety procedures.

**DEFICIENCIES:**

- 1. Manpower: Crew shortages and turbulence have been raised as potential problems for ITV crews (e.g., Hammond & Redden, 1984; Hammond, 1985). Crew shortages and turbulence also were noted informally as problems during the current research. However, there is no suggestion that these problems exist based on available MOS 11H fiscal year (FY) 88 year end force structure data (Table K-1).
- 2. Personnel: No personnel deficiencies were noted. Current Armywide quality goals for this MOS are being met.
- 3. Training: No training deficiencies were noted, although deficiencies in unit training are probable given crew shortages and turbulence. Elements of this task are trained as part of the 11H OSUT program of instruction. Associated instruction includes: "Conduct pre-operational maintenance checks and series (PMCS) (OCL) on an ITV (M901) turret," "Engage a Target with the ITV (M901) Dual Launcher," "Qualify with the ITV (M901) dual launcher." Elements of the task also are trained as part of the Advanced Noncommissioned Officers Course ("Conduct Operational Checks on the ITV Weapons Station and Dual Launcher") and ITV Trainer course. The latter course provides approximately 80 hours of ITV operator/crew training covering basically the same tasks as OSUT covers.

#### SOLUTIONS FOR IDENTIFIED DEFICIENCIES:

Due to the highly procedural nature of this task and consequences of inadequate performance, it must be constantly refreshed to be sustained. Learning and memory demands can be alleviated greatly in future systems by reducing the number of procedures that must be performed manually and by improving the sequencing and organization of these procedures. This can be accomplished in large measure by designing operator panels so that turret procedures are predictable or cue one another in sequence.

MOS: 11H

TASK NUMBER: 071-212-0005

TASK TITLE: Maintain the Engine on an M113-Series Vehicle

PERFORMANCE STEPS:

NOTE 1: The operator will make corrections when and where required and within the scope of the operator's realm of responsibility.

NOTE 2: Uncorrected faults will be recorded on DA Form 2404 and reported to organizational maintenance through the chain of command.

1. Gain access to the vehicle's power compartment through the front of the vehicle.

NOTE 3: With the engine operating at normal temperature (160 to 230 degrees F), stop the engine, wait 5 minutes, then check the oil level.

NOTE 4: Ensure that the vehicle is on a smooth level surface prior to inspecting the vehicle's fluid levels.

2. Inspect the fluid levels in the vehicle's engine and change the lubricants when, and if, required.
3. Inspect the fluid levels in the final drives (see LO 9-2350-259-12).

NOTE 5: If the engine has been running, wait 10 or 15 minutes after stopping the engine before checking the differential oil level.

4. Inspect the differential oil levels.
5. Inspect the engine compartment for missing or loose bolts, screws, and nuts.
6. Inspect the universal joints (three locations) for obvious signs of looseness.
7. Inspect all electrical wires and connectors for chipped, broken, or missing insulation.
8. Inspect all hoses and fluid lines for wear, damage, and leaks, and ensure that all clamps and connectors are tight.
9. Lubricate all points on the engine as required by the appropriate LO and/or in accordance with the unit's program of scheduled maintenance.

10. Inspect all drive belts for wear, damage, and correct tension.
11. Inspect the AIRBOX HEATER ACCUMULATOR for serviceability and visual signs of damage.
12. Inspect all flexible air intake ducts for damage.

Warnings and cautions associated with this task are as follows:

- a. DO NOT operate the vehicle with any holes or tears in the flexible ducting or damage to the engine could result.
- b. DO NOT run the vehicle's engine or heater in an enclosed area unless it is WELL ventilated. Death or severe injury to personnel could occur from carbon monoxide poisoning.
- c. DO NOT start the engine if fuel leak(s) is(are) discovered in the engine compartment.
- d. Ensure that the differential filler cap is closed tight after oil level inspection. During operation, pressure is built up in the differential which could force the oil out and damage to the differential could result.

**EQUIPMENT USED WITH/TO PERFORM TASKS:**

1. M113-Series Vehicle with Basic Issue Items (BII).
2. Lubricants as required.
3. Cleaning rags as required.
4. Blank DA Form 2404s as required.

**CONDITIONS:**

In a combat environment, given an M113-Series Vehicle with BII, blank DA Form 2404s, lubricants as required, cleaning rags, and a requirement to perform operator maintenance on the vehicle's engine.

**STANDARDS:**

Scheduled and/or other required maintenance has been performed on the engine of an M113-Series Vehicle. The engine has been inspected for cleanliness, fuel leaks, and other visible signs of damage. In addition, the engine's fluid levels have been inspected, fluids added and/or changed as required by the appropriate lubrication order. Uncorrected faults have been recorded and reported to organizational maintenance through the chain of command.

**REQUIRED KNOWLEDGE, SKILLS, AND ABILITIES:**

**1. Knowledge:**

- a. Knowledge of how to inspect the vehicle's engine.
- b. Know what to inspect for in the engine compartment.
- c. Knowledge of safety as relates to performance of maintenance on the vehicle's engine.
- d. Know how to gain access to the vehicle's engine compartment.
- e. Know how to classify fuel and other fluid leaks.
- f. Know how to record uncorrected faults on DA Form 2404.
- g. Know when and how to change lubricating fluids in the engine.
- h. Know how to determine the frequency of scheduled maintenance.
- i. Know how to use the appropriate lubrication order as an aid to performance of maintenance on the vehicle's engine.
- j. Know the limits of responsibility of operator maintenance.
- k. Know how and when to conduct cold checks of the vehicle's engine fluids.

**2. Skills:**

- a. Cognitive: Following procedures, evaluating conditions, making decisions.
- b. Psychomotor: Gross motor skills, positioning movements.
- c. Perceptual: Detecting signals.

**3. Abilities:**

- a. Ability to follow instructions.
- b. Ability to recognize faults in the vehicle's engine and related components.
- c. Ability to apply safety as relates to performing scheduled and/or other required maintenance on the vehicle's engine.

- d. Ability to record uncorrected faults on DA Form 2404.
- e. Ability to classify fluid leaks.
- f. Ability to gain access to the vehicle's power plant.
- g. Ability to change lubricants as required by the appropriate lubrication order.
- h. Ability to determine the frequency of scheduled maintenance.
- i. Ability to make corrections as required and within the scope of the operator's realm of responsibility.
- j. Ability to recognize faults that require the vehicle to be placed in a deadline status.

**DEFICIENCIES:**

- 1. Manpower: Crew shortages and turbulence have been raised as potential problems for ITV crews (e.g., Hammond & Redden, 1984; Hammond, 1985). Crew shortages and turbulence also were noted informally as problems during the current research. However, there is no suggestion that these problems exist based on available MOS 11H fiscal year (FY) 88 year end force structure data (Table K-1).
- 2. Personnel: No personnel deficiencies were noted. Current Armywide quality goals for this MOS are being met.
- 3. Training: This task is trained in the unit. No deficiencies were noted, although deficiencies are probable given crew shortages and turbulence.

**SOLUTIONS FOR IDENTIFIED DEFICIENCIES:**

Interviews with instructors suggest that this is not a high driver task. A similar conclusion is suggested by the work of Hammond (1985), where shortfalls in maintenance knowledge were found to center around the turret/weapons system--not the automotive components.

**MOS: 11H**

**TASK NUMBER: 071-212-0009**

**TASK TITLE: Maintain the Personnel Heater on an M113-Series Vehicle**

**PERFORMANCE STEPS:**

**NOTE:** If any class of fuel leak is detected in the heater or in the fuel lines during the inspection, the heater **MUST NOT** be operated, until the leak(s) has been corrected and the system is inspected by organizational maintenance.

1. Inspect the personnel heater and fuel lines for leaks.
2. Inspect the heater and controls for visible signs of damage.
3. Inspect to ensure that nothing is blocking the personnel heater exhaust, air inlet, or heat ducts.
4. Inspect the personnel heater electrical circuits by pushing the PRESS-TO-TEST light cover. (The indicator light should come on before starting the heater).
5. Record all uncorrected faults on DA Form 2404.
6. Report all uncorrected faults to the chain of command.

Warnings and cautions associated with this task are as follows:

DO NOT operate the personnel heater, if any fuel leak is found in the heater or the fuel lines. Personnel could be killed or seriously injured.

**EQUIPMENT USED WITH/TO PERFORM TASKS:**

1. M113-series vehicle with basic issue items (BII) with an installed personnel heater.
2. Blank DA Forms 2404 as required.

**CONDITIONS:**

In a combat environment, given an M113-series vehicle with BII, blank DA Forms 2404 as required, and a requirement to perform operator maintenance on the vehicle's personnel heater.

**STANDARDS:**

Scheduled and other required maintenance has been performed on the vehicle's personnel heater. The heater and fuel

lines have been inspected and corrections were made where required and within the scope of the operator's of responsibility. Additionally, uncorrected faults have been recorded on DA Form 2404 and reported to organizational maintenance, through the chain of command.

**REQUIRED KNOWLEDGE, SKILLS, AND ABILITIES:**

1. Knowledge:

- a. Know the location and how to operate the vehicle's personnel heater.
- b. Know safety as relates it to when NOT to operate the vehicle's personnel heater.
- c. Know the location and how to trace the heater's fuel lines.
- d. Know how to inspect for and to classify fuel leaks in the heater system.
- e. Know how to inspect the operation of the personnel heaters electrical system.
- f. Know how to record uncorrected faults on DA Form 2404.

2. Skills:

- a. Cognitive: Following procedures, evaluating conditions, making decisions.
- b. Psychomotor: Gross motor skills, positioning movements.
- c. Perceptual: Detecting signals.

3. Abilities:

- a. Ability to locate and trace the heater's fuel lines.
- b. Ability to detect fuel leaks in the personnel heater system.
- c. Ability to classify fuel leaks using procedures prescribed in the appropriate technical manual.
- d. Ability to locate and operate the control switches on the vehicle's personnel heater.



### DEFICIENCIES:

1. Manpower: Crew shortages and turbulence have been raised as potential problems for ITV crews (e.g., Hammond & Redden, 1984; Hammond, 1985). Crew shortages and turbulence also were noted informally as problems during the current research. However, there is no suggestion that these problems exist based on available MOS 11H fiscal year (FY) 88 year end force structure data (Table K-1).
2. Personnel: No personnel deficiencies were noted. Current Armywide quality goals for this MOS are being met.
3. Training: Operator maintenance on M113-series vehicle personnel heaters is trained almost entirely in units. This level of training and/or the level of operator training per se appears deficient. Discussions with instructors suggest that personnel heater maintenance would be far less a problem if soldiers were better trained to operate them in the first place. It is very easy to burn out the igniter on a personnel heater, and this is one of the most frequently reported malfunctions.

### SOLUTIONS FOR IDENTIFIED DEFICIENCIES:

Providing infantry OSUT soldiers instruction on the correct start up and shut down procedures for M113-series vehicle personnel heaters is a tenable solution. This instruction should help prevent the need for personnel heater repairs and alleviate many of the concerns related to the lack of spare parts (e.g., igniters), detailed manuals, and crew-level authorization for maintenance.

**MOS: 11H**

**TASK NUMBER: 071-212-0013**

**TASK TITLE: Maintain the Hydraulic System on an M113-Series Vehicle**

**PERFORMANCE STEPS:**

1. Inspect the ramp fluid level by viewing the ramp hydraulic fluid level sight glass.
2. Inspect the fluid level in the ramp fluid level reservoir.
3. Inspect the entire hydraulic system for leaks.
4. Make corrections as required and within the scope of the operator's responsibility.
5. Record all uncorrected faults on DA Form 2404.
6. Report all uncorrected faults to organizational maintenance through the chain of command.

**EQUIPMENT USED WITH/TO PERFORM TASKS:**

1. M113-Series Vehicle with Basic Issue Items (BII).
2. Cleaning rags as required.
3. Blank DA Form 2404s as required.

**CONDITIONS:**

In a combat environment, given an M113-Series vehicle with Basic Issue Items (BII), cleaning rags as required, and a requirement to maintain the hydraulic system on an M113-Series vehicle.

**STANDARDS:**

Scheduled and/or other required operator maintenance has been performed on the hydraulic system on an M113-Series vehicle. The system has been inspected, corrections were made where required within the scope of the operator's responsibility, uncorrected faults were recorded on DA Form 2404, and reported to the chain of command.

**REQUIRED KNOWLEDGE, SKILLS, AND ABILITIES:**

1. Knowledge:
  - a. Knowledge of the vehicle's hydraulic system.

- b. Knowledge of how to start and stop the vehicle's engine.
- c. Know the location of the ramp hydraulic fluid level sight glass.
- d. Know the location of and how to gain access to the ramp hydraulic fluid reservoir.
- e. Know how to determine when the fluid level is low.
- f. Know how to inspect the system for leaks.
- g. Know the procedure for classifying of fluid leaks.
- h. Know how to add fluid as required to fill the system to its rated capacity.

**NOTE:** The vehicle's ramp must be lowered in order to inspect the ramp hydraulic fluid level by viewing of the sight glass. Fluid must be visible in the sight glass or the system must be reported to organizational maintenance through the chain of command.

2. Skills:

- a. Cognitive: Following procedures, evaluating conditions, making decisions.
- b. Psychomotor: Gross motor skills, positioning movements.
- c. Perceptual: Detecting signals.

3. Abilities:

- a. Ability to gain access to the ramp hydraulic system fluid reservoir.
- b. Ability to locate the ramp hydraulic fluid level sight glass.
- c. Ability to operate the ramp controls.
- d. Ability to start and stop the vehicle's engine.
- e. Ability to determine when the fluid level is correct.
- f. Ability to inspect for leaks in the system.
- g. Ability to classify various types of leaks in the system.

- h. Ability to replace fluids as required to fill the system to its rated capacity.

#### **DEFICIENCIES:**

1. Manpower: Crew shortages and turbulence have been raised as potential problems for ITV crews (e.g., Hammond & Redden, 1984; Hammond, 1985). Crew shortages and turbulence also were noted informally as problems during the current research. However, there is no suggestion that these problems exist based on available MOS 11H fiscal year (FY) 88 year end force structure data (Table K-1).
2. Personnel: No personnel deficiencies were noted. Current Armywide quality goals for this MOS are being met.
3. Training: This task is trained in the unit. No deficiencies were noted, although deficiencies are probable given crew shortages and turbulence.

#### **SOLUTIONS FOR IDENTIFIED DEFICIENCIES:**

The ITV is affected by leaky turret hydraulics. This is not a problem peculiar to the ITV, although the hydraulics on the ITV have been singled out for their fragility (e.g., Hammond & Redden, 1984). Leaks are typical of most hydraulic systems. Interviews with instructors suggest that this task probably is overrated as a problem task. Leaks in hydraulic systems look bigger than they are (since fluid will run down the hydraulic tubes and collect at the bottom in drops). On the other hand, TOE unit soldiers frequently noted concerns about the leaky turret hydraulics and felt these leaks represented a continuing maintenance problem for them. The only apparent solution for this deficiency is a system design change aimed at eliminating the need for turret hydraulics or reducing the tendency of these systems to leak.

MOS: 11H

TASK NUMBER: 071-212-0014

TASK TITLE: Maintain the Track and Suspension System on an M113-Series Vehicle

PERFORMANCE STEPS:

NOTE 1: Any evident class 3 leaks require that the vehicle be reported NOT READY. Class 1 and 2 leaks should be reported to organizational maintenance through the chain of command as soon as possible.

NOTE 2: Steps 1-4 are performed prior to operating the vehicle.

1. Inspect and classify any leaks found in the vicinity of the vehicle's road wheel hubs and idler wheel hubs.

NOTE 3: Report missing plugs to organizational maintenance IMMEDIATELY, through the chain of command.

2. Check beneath the vehicle for loose or missing hull access and drain plugs (5 plugs).
3. Tighten loose hull access and drain plugs.

NOTE 4: The following steps are performed as required and/or upon termination of daily operations.

NOTE 5: The vehicle will be placed in deadline status and reported to organizational maintenance if missing, bent, or cracked roadwheels or idler wheels are identified and/or the mounting holes are elongated.

4. Inspect the roadwheels and idler arms for overheating, missing, bent, or cracked roadwheels and idler wheels.
5. Inspect the roadwheels and idler wheels for worn mounting holes by looking for a shiny area around the mounting nuts.

NOTE 6: If a hub feels hotter than other hubs on the vehicle or hotter than normal, it is a good indicator that the bearing is in need of servicing. Report any hub that feels hotter than normal to organizational maintenance through the chain of command.

NOTE 7: The vehicle will be reported to the chain of command and organizational maintenance and placed in a deadline status when separation of one-half of rubber from the steel hub occurs and when chunking occurs across half the width of the other rubber surface.

6. Inspect the roadwheels and idler wheels for excessive heat, worn mounting holes, and separation of rubber from metal.
- NOTE 8:** Report any excessively hot final drive housing to organizational maintenance through the chain of command. The vehicle will be placed in a deadline status if any overheating final drive housing is found.
7. Inspect the final drive bearings for overheating.
- NOTE 9:** The vehicle will be reported to organizational maintenance through the chain of command and placed in a deadline status if cracked or missing sprocket teeth are identified and if three or more bolts are missing.
8. Inspect the sprockets for broken or missing teeth.
  9. Hand check sprocket bolts to ensure that they are tight.
- NOTE 10:** Heat build up is an indicator that the shock absorbers are functioning properly. A cold shock absorber indicates that the shock is defective and must be reported to organizational maintenance.
10. Inspect the vehicle's shock absorbers for heat build up after the vehicle has been moved for an extended period of time.
- NOTE 11:** The vehicle will be reported to organizational maintenance when three or more damaged track shoes on one side of the vehicle have been identified.
11. Inspect the track shoes and pins for obvious damage such as broken pins, worn track shoe pads, and worn bushings.
  12. Measure any track shoe pad and/or bushing suspected of excessive wear.
- NOTE 12:** The vehicle will be reported to organizational maintenance and placed in a deadline status if any bent, broken, or missing roadwheel arms or torsion bars are identified.
13. Inspect the roadwheel arms and torsion bars for bent, broken, or missing roadwheel arms and torsion bars.
- NOTE 13:** Inspect the vehicle's lubrication order and determine if the vehicles hubs are filled with oil or grease. The oil-filled hub will have a sight glass with no grease fitting.
- NOTE 14:** The vehicle will be reported to organizational maintenance if a cracked or broken sight glass is found and a class 3 oil leak has been identified or if any

grease fitting or relief valve is missing. The vehicle will also be reported to maintenance if, during a visual inspection, the oil in the wheel hubs appears milky or if bubbles are visible. (This is an indicator that water is in the system).

14. On vehicles equipped with oil filled hubs, inspect the wheel hubs for leaks, broken, or cracked sight windows and the correct oil level.
15. On vehicles equipped with grease fittings, inspect the hubs by adding grease to the fitting until it comes out of the pressure relief valve. (See the tech manual appropriate for the type of vehicle being inspected for servicing procedures for grease filled hubs.)
16. Ensure that all uncorrected faults are recorded on DA Form 2404 and reported to organizational maintenance through the chain of command.

Warnings and cautions associated with task are as follows:

1. Road wheel hubs and idler wheel hubs can heat up enough to burn the skin if touched by the soldier. Inspect for hot hubs and wheels by holding the hand close to, but not touching, the wheels and/or hubs. The same WARNING applies to inspection of the final drive housings.
2. Use care when inspecting the final drive housings on the vehicle. They can generate sufficient heat to burn the soldier.
3. Ensure that care is used when inspecting the roadwheel hubs and idler wheel hubs. They can heat up sufficiently to burn the soldier.

#### **EQUIPMENT USED WITH/TO PERFORM TASKS:**

1. M113-Series Vehicle with Basic Issue Items (BII).
2. Lubricants as required.
3. Cleaning rags as required.
4. Blank DA Form 2404s as required.

#### **CONDITIONS:**

In a combat environment, given an M113-Series Vehicle with Basic Issue items (BII), cleaning rags and lubricants as required, blank DA Form 2404 as required, and a requirement to perform operator maintenance on the vehicle's track and suspension system.

**STANDARDS:**

Scheduled and/or other required maintenance has been performed on the track and suspension system on an M113-Series Vehicle. The system has been inspected, corrections made where required, and uncorrected faults recorded on DA Form 2404 and reported to the chain of command.

**REQUIRED KNOWLEDGE, SKILLS, AND ABILITIES:****1. Knowledge:**

- a. Knowledge of inspection procedures as applicable to the track and suspension system on an M113-Series Vehicle.
- b. Know the scope of the operator's maintenance responsibility.
- c. Knowledge of how to break and rejoin the vehicle's track system in order to replace defective track shoes.
- d. Know how to check for bent, broken, or missing road wheel arms or torsion bars.
- e. Know how to record uncorrected faults on DA Form 2404.
- f. Know how to replace track shoes when required.
- g. Know how to inspect the final drive housings for overheating.
- h. Know procedure for inspecting of the road wheel arms and torsion bars.
- i. Know when to inspect the track and suspension system other than when scheduled.
- j. Know the procedure for measuring the track shoes and bushings for excessive wear.
- k. Know the procedure used for identifying a broken or missing torsion bar.
- l. Know how to determine if the wheel hubs are filled with oil or grease.

**2. Skills:**

- a. Cognitive: Following procedures, evaluating conditions, making decisions.



- b. Psychomotor: Gross motor skills, positioning movements.
  - c. Perceptual: Detecting signals.
3. Abilities:
- a. Ability to inspect for and recognize defective road wheel arms and torsion bars.
  - b. Ability to make corrections as required and within the scope of the operator's realm of responsibility.
  - c. Ability to record all uncorrected faults on DA Form 2404 following procedures prescribed in DA Pam 738-750.
  - d. Ability to remove and replace track shoe pads as required.
  - e. Ability to break track and replace track shoes.
  - f. Ability to recognize defective shock absorbers.
  - g. Ability to determine the frequency of scheduled maintenance.
  - h. Ability to recognize defects in the wheel hubs and its lubricant.
  - i. Ability to determine when the vehicle's track and suspension system will be inspected other than during scheduled maintenance.
  - j. Ability to determine if the vehicle's wheel hubs are filled with oil or grease.

**DEFICIENCIES:**

- 1. Manpower: Crew shortages and turbulence have been raised as potential problems for ITV crews (e.g., Hammond & Redden, 1984; Hammond, 1985). Crew shortages and turbulence also were noted informally as problems during the current research. However, there is no suggestion that these problems exist based on available MOS 11H fiscal year (FY) 88 year end force structure data (Table K-1).
- 2. Personnel: No personnel deficiencies were noted. Current Armywide quality goals for this MOS are being met.
- 3. Training: This task is trained in the unit. No deficiencies were noted, although deficiencies are probable given crew shortages and turbulence.

**SOLUTIONS FOR IDENTIFIED DEFICIENCIES:**

The most demanding aspect of this task is breaking the track and replacing worn track shoes. Crew shortages can only intensify these demands. Efforts aimed at minimizing the effects of these shortages should aid to offset any problems posed by this task in future systems.

**MOS: 11H**

**TASK NUMBER: 071-212-0021**

**TASK TITLE: Drive an M113-Series Vehicle**

**PERFORMANCE STEPS:**

1. Perform operational checks.
2. Apply required safety measures such as wearing seat belt and hearing protection, using ground guides, and giving warnings prior to moving the vehicle and lowering or raising the ramp.
3. Apply vehicle starting procedures.
4. Set gear selector as required, and drive the vehicle at appropriate speeds based on specific conditions and instructions from supervisor.
5. Monitor driver controls and gages for normal vehicle operation.
6. Drive the vehicle over trenches, obstacles, shallow streams (3.5 feet or less), slopes, hills, and on snow, ice, or mud by applying the appropriate driving technique for the specific condition.
7. During water operations, ensure vehicle is properly prepared. Exercise extreme caution during entry and exit and apply water driving techniques.
8. During reduced visibility, use night vision devices or aids. Vehicle driving techniques remain the same for specific conditions.
9. Apply engine shutdown procedures after completion of mission.

Failure to heed the following warnings will result in damage to the vehicle and injury to personnel:

1. Do not climb obstacles higher than 2 feet.
2. Do not drive on grades that exceed 60 percent.
3. Do not drive on side slopes steeper than 30 percent.
4. Do not cross trenches that exceed 5.5 feet.

Carbon monoxide poisoning can kill. Obey the following rules:

1. Do not run engine or heater in an enclosed area unless it is WELL VENTILATED.
2. Do not idle engine for long periods without GOOD VENTILATION to all parts of the vehicle where there are personnel.
3. Do not drive the vehicle with any power plant access plate, cover, or door open or removed.
4. BE ALERT all the time during operation of the vehicle for the smell of exhaust fumes or signs of exposure to carbon monoxide. If detected, IMMEDIATELY VENTILATE all parts of the vehicle where there are personnel.

**EQUIPMENT USED WITH/TO PERFORM TASKS:**

1. M113-Series Vehicle with Basic Issue Items (BII).
2. Lubricants as required.
3. Cleaning rags as required.
4. Blank DA Form 2404s as required.

**CONDITIONS:**

Given an M113-series vehicle, basic issue items (BII), and a requirement to drive the vehicle across varying terrain, and in all weather conditions.

**STANDARDS:**

Driving techniques for operating the vehicle across varying terrain and in all weather conditions have been applied. The vehicle has been driven safely without damage to the vehicle or injury to personnel.

**REQUIRED KNOWLEDGE, SKILLS, AND ABILITIES:**

1. Knowledge:
  - a. Know identity, location, and function of vehicle controls and gages.
  - b. Know how to manipulate vehicle controls.
  - c. Know operational sequence of vehicle controls.
  - d. Know indications of vehicle gages.

- e. Know driving techniques for varying terrain and weather.
  - f. Know safety precautions.
  - g. Know indications of traffic signs.
2. Skills:
- a. Cognitive: Following procedures, evaluating conditions, making decisions.
  - b. Psychomotor: Gross motor skills, tracking, positioning movements.
  - c. Perceptual: Detecting signals.
3. Abilities:
- a. Ability to apply engine start/stop procedures.
  - b. Ability to apply driving techniques for varying terrain and weather.
  - c. Ability to apply safety precautions.
  - d. Ability to read and interpret vehicle gages.
  - e. Ability to read and interpret traffic signs.

#### **DEFICIENCIES:**

- 1. Manpower: Crew shortages and turbulence have been raised as potential problems for ITV crews (e.g., Hammond & Redden, 1984; Hammond, 1985). Crew shortages and turbulence also were noted informally as problems during the current research. However, there is no suggestion that these problems exist based on available MOS 11H fiscal year (FY) 88 year end force structure data (Table K-1).
- 2. Personnel: No personnel deficiencies were noted. Current Armywide quality goals for this MOS are being met.
- 3. Training: This task is trained in the unit. No deficiencies were noted, although deficiencies are probable given crew shortages and turbulence.

#### **SOLUTIONS FOR IDENTIFIED DEFICIENCIES:**

Three reasons were cited by soldiers for identifying this task as a high driver. All of the reasons point toward the need for specific system design changes in future vehicles. The reasons are as follows:

1. The ITV lacks speed, power, and maneuverability. The top-heavy design of the vehicle limits its hill climbing capability and makes it susceptible to tipping over and rolling.
2. The design of the driver's compartment and seat make driving the vehicle a tiring task. Driver's frequently report developing lower back pains from driving the vehicle over even short distances.
3. Driving the vehicle at night under blackout light conditions or using the driver infrared periscope (M19) also are frequently cited as causing focus and depth-perception problems.

**MOS: 11H**

**TASK NUMBER: 071-214-0001**

**TASK TITLE: Maintain the Turret on an M901 Vehicle**

**PERFORMANCE STEPS:**

1. Conduct an operational checkout of the turret and fire control equipment as prescribed in TM 9-2350-259-10.
2. Correct shortcomings and deficiencies within the scope of the operator's capabilities.
3. Clean and lubricate the turret where and when required following the schedule and procedures prescribed in TM 9-2350-259-10.
4. Record any uncorrected shortcomings and deficiencies on DA 2404 and in the vehicle's log book as required by DA Pam 738-750.
5. Report any uncorrected shortcomings and deficiencies to the chain of command.

**EQUIPMENT USED WITH/TO PERFORM TASKS:**

1. M901 with basic issue items (BII).
2. Rags and cleaning supplies as required.

**CONDITIONS:**

Given an M901 with BII, assigned driver, TM 9-2350-259-10, DA Forms 2404, DA Pam 738-750, a pencil, and a requirement to perform scheduled or required maintenance on the turret.

**STANDARDS:**

Scheduled or required maintenance has been performed on the M901 turret in accordance with procedures described in TM 9-2350-259-10, any uncorrectable deficiencies recorded on DA Form 2404 in accordance with procedures described in DA Pam 738-750, and reported to the chain of command.

**REQUIRED KNOWLEDGE, SKILLS, AND ABILITIES:**

1. Knowledge:
  - a. Know how to use and interpret TM 9-2350-259-10.
  - b. Know how to record deficiencies on DA Form 2404.
  - c. Know location and identity of turret controls.

- d. Know how to operate turret controls.
  - e. Know characteristics of operable/inoperable turret equipment.
2. Skills:
- a. Cognitive: Following procedures, evaluating conditions, making decisions.
  - b. Psychomotor: Gross motor skills, positioning movements.
  - c. Perceptual: Detecting signals.
3. Abilities:
- a. Ability to apply maintenance procedures as prescribed in TM 9-2350-2592-10.
  - b. Ability to record deficiencies on DA Form 2404 IAW DA Pam 738-750.

#### **DEFICIENCIES:**

1. Manpower: Crew shortages and turbulence have been raised as potential problems for ITV crews (e.g., Hammond & Redden, 1984; Hammond, 1985). Crew shortages and turbulence also were noted informally as problems during the current research. However, there is no suggestion that these problems exist based on available MOS 11H fiscal year (FY) 88 year end force structure data (Table K-1).
2. Personnel: No personnel deficiencies were noted. Current Armywide quality goals for this MOS are being met.
3. Training: Operator maintenance on the M901 Vehicle turret is trained almost entirely in units. This level of training appears deficient based on data cited by Hammond (1985) and informal observations made during this research.

#### **SOLUTIONS FOR IDENTIFIED DEFICIENCIES:**

As indicated by Hammond (1985), most of the ITV's maintenance problems and most of the shortfall in maintenance knowledge centered around the turret/weapon system. Hammond went on to note that many of the NCOs and officers in ITV companies do not supervise maintenance of the vehicle/weapon system. This he felt was because these individuals are not trained well enough to do an adequate job in the turret/weapon system maintenance and



troubleshooting area. Based on informal observations made during the present research, Hammond's (1985) recommendation appears most reasonable.

**Table K-1**

**FY88 Year End Force Structure (Active Duty Enlisted Only), MOS 11H**

<u>GRADE</u>	<u>REQUIRED</u>	<u>AUTHORIZED</u>	<u>TOTAL INVENTORY*</u>
<b>QUANTITY</b>			
E1-4	4369	5380	5832
E5	868	1040	1035
E6	1305	1270	932
E7	713	742	482
E8-9	301	316	119
TOTAL	7556	8748	8400
<b>PERCENTAGES</b>			
E1-4	.58	.61	.69
E5	.11	.12	.12
E6	.17	.15	.11
E7	.09	.08	.06
E8-9	.04	.04	.01
TOTAL	1.00	1.00	1.00

Note: \*Total of all individuals carrying this primary MOS including trainees, transients, holdees and students (TTHS).

Table K-2

Retention Trends (Active Duty Enlisted Only), MOS 11H

	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>
<u>RETENTION TRENDS (QUANTITY)</u>						
FIRST TERMERS (0-4 YOS)	3497	3222	3459	4175	3700	3680
MID CAREERISTS (5-10 YOS)	1905	1776	1724	1475	1330	1214
CAREERISTS (11-20)	703	834	921	977	1020	1121
CAREERISTS (>20 YOS)	12	6	6	6	6	35
TOTAL	6117	5838	6110	6633	6056	6050
<u>RETENTION TRENDS (PERCENTAGE)</u>						
FIRST TERMERS (0-4 YOS)	.70	.71	.76	.76	.73	.72
MID CAREERISTS (5-10 YOS)	.85	.84	.82	.81	.85	.89
CAREERISTS (11-20 YOS)	.94	.94	.92	.93	.93	.94
CAREERISTS (>20 YOS)	.57	.55	.60	.50	.55	.78
TOTAL	.76	.77	.80	.79	.78	.78

Table K-3

## Accession Quality Trends (Active Duty Enlisted Only), MOS 11H

	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>	<u>FY88</u>
<u>MENTAL CATEGORY</u> <u>(QUANTITY)</u>							
1	71	91	93	107	58	124	103
2	316	445	779	687	511	703	756
3A	198	241	428	453	315	489	521
3B	296	366	274	497	289	398	500
4	213	142	243	257	62	76	107
UNKNOWN	12	3	1	2	3	2	2
TOTAL	1106	1288	1808	2003	1238	1792	1989
<u>AFQT AVE SCORE</u>	54	58	60	57	61	62	60
<u>MENTAL CATEGORY</u> <u>(PERCENTAGE)</u>							
1	.06	.07	.05	.05	.05	.07	.05
2	.29	.35	.43	.34	.41	.39	.38
3A	.18	.19	.24	.23	.25	.27	.26
3B	.27	.28	.15	.25	.23	.22	.25
4	.19	.11	.13	.13	.05	.04	.05
UNKNOWN	.01	.00	.00	.00	.00	.00	.00
TOTAL	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table K-4

## Accession ASVAB Score Trends (Active Duty Enlisted Only), MOS 11H

	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>	<u>FY88</u>
<b><u>SCORE (QUANTITY)</u></b>							
<85	1	2	1	1	2	3	3
85-90	64	46	68	44	11	20	31
91-95	119	100	167	203	115	161	144
96-100	108	108	166	223	128	156	175
101-105	136	147	198	244	138	207	228
106-110	144	175	208	273	194	251	263
111-115	142	176	247	297	200	285	280
116-120	134	173	243	277	172	264	217
>120	246	358	509	439	275	443	384
UNKNOWN	12	3	1	2	3	2	264
TOTAL	1106	1288	1808	2003	1238	1792	1989
<b><u>AVG ASVAB</u></b>							
	110	112	112	110	111	112	111
<b><u>SCORE (PERCENTAGE)</u></b>							
<85	.00	.00	.00	.00	.00	.00	.00
85-90	.06	.04	.04	.02	.01	.01	.02
91-95	.11	.08	.09	.10	.09	.09	.07
96-100	.10	.08	.09	.11	.10	.09	.09
101-105	.12	.11	.11	.12	.11	.12	.11
106-110	.13	.14	.12	.14	.16	.14	.13
111-115	.13	.14	.14	.15	.16	.16	.14
116-120	.12	.13	.13	.14	.14	.15	.11
>120	.22	.28	.28	.22	.22	.25	.19
UNKNOWN	.01	.00	.00	.00	.00	.00	.13
TOTAL	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Note: Composite ASVAB (combat, CO) scores are calculated based on the 80 metric.

Table K-5

FY88 Year End Education Profile (Active Duty Enlisted Only), MOS 11H

	<u>E1-4</u>		<u>E5</u>		<u>E6</u>		<u>E7</u>		<u>E8-9</u>		<u>TOTALS</u>	
	<u>Q</u>	<u>%</u>	<u>Q</u>	<u>%</u>	<u>Q</u>	<u>%</u>	<u>Q</u>	<u>%</u>	<u>Q</u>	<u>%</u>	<u>Q</u>	<u>%</u>
HSG & ABOVE	5046	.60	903	.11	746	.09	399	.05	86	.01	7180	.85
GED (HS EQUIVALENCY)	502	.06	114	.01	184	.02	82	.01	33	.00	915	.11
NHSG	277	.03	15	.00	2	.00	0	.00	0	.00	294	.03
UNKNOWN	7	.00	3	.00	0	.00	1	.00	0	.00	11	.00
TOTAL	5832	.69	1035	.12	932	.11	482	.06	119	.01	8400	1.00

Note: Q = quantity.

Table K-6

Accessions Over Time (Quality Distribution), MOS 11H

	Non-Prior Service <u>PROG</u>	Non-Prior Service <u>FILL</u>	<u>% FILL</u>	MENTAL CATEGORY					
				<u>1-3A TGT%</u>	<u>1-3A FILL%</u>	<u>3B TGT%</u>	<u>3B FILL%</u>	<u>4 TGT%</u>	<u>4 FILL%</u>
FY 1987	0	112	*****	61.0	62.5	28.0	28.6	11.0	8.9
FY 1988	140	117	83.6	61.0	59.0	28.0	32.5	11.0	8.5
FY 1989	80	19	23.8	61.0	73.7	28.0	21.1	11.0	5.3

# APPENDIX L

## HUMAN FACTORS ENGINEERING, SYSTEM SAFETY, AND HEALTH HAZARDS RATINGS PRESENTED BY CREW AND SOLDIER POPULATION

### COMMON CREW ISSUES IOE Unit Soldier Ratings Summary

PROBLEM	ISSUE	SQUAD LEADER	GUNNER	DRIVER	LOADER	MEAN RATING
Serious	Amount of safety/crash padding	2.75	2.75	2.50	3.00	2.75
	Malfunctions of heater	2.75	3.00	2.50	2.75	2.75
	Crowding/cramped in vehicle	3.00	1.75	3.00	2.75	2.63
	Low temperature in vehicle	3.00	2.00	2.00	3.00	2.50
Moderate	Adequacy of seat back support	2.63	2.25	2.00	2.75	2.41
	Gen. discomfort-long ride	2.25	2.00	2.25	3.00	2.38
	Being bounced around vehicle	2.63	2.00	2.00	2.75	2.35
	Vulnerable as boresight/coll.	3.00	2.00	1.75	2.50	2.31
	Getting over/passing by seats	2.50	1.75	2.00	2.75	2.25
	Too little leg room	2.50	1.00	3.00	2.50	2.25
	Ability to care for injured	2.75	2.00	1.50	2.50	2.19
	Vibration in vehicle	2.75	1.75	1.75	2.50	2.19
	Too little head room	2.50	1.50	2.25	2.50	2.19
	Clothes,web gear snag in/out	2.75	1.25	1.75	3.00	2.19
	Move out w/o reboresight/coll.	2.88	1.50	2.00	2.25	2.16
	Too little hip/shoulder room	2.50	1.00	2.75	2.25	2.12
	Adjust seat to be comfortable	2.38	1.50	1.75	2.75	2.10
	Discomfort at high speeds	1.88	1.50	2.25	2.75	2.10
	MG not operate while launching	2.50	1.25	1.75	2.75	2.06
	High temperature in vehicle	2.25	2.00	2.00	2.00	2.06
	Getting into your seat	2.25	1.50	2.00	2.25	2.00
	Objects sticking out-hazards	2.50	1.50	1.25	2.50	1.94
	Noise annoying to you	2.00	1.25	1.75	2.50	1.88
	Disorientation while riding	1.75	1.25	1.75	2.75	1.88
	Escaping from the vehicle	2.50	1.75	.75	2.25	1.81
	Gen. discomfort-short ride	2.25	1.00	1.75	2.25	1.81
	Closeness of SL to turret	2.00	1.75	1.75	1.50	1.75
	Lighting at duty position	2.25	1.00	1.50	2.25	1.75
	Adequacy of lighting	2.50	1.00	1.25	2.25	1.75
	Operating bkup hydraulic pump	2.50	1.25	1.25	1.75	1.69
	Discomfort at slow speeds	1.75	1.00	1.50	2.50	1.69
	Headset/helmet comfort	2.50	1.25	.75	2.25	1.69
	Exit vehicle from your seat	2.50	1.50	1.00	1.75	1.68
	Malfunctions of radio/intercom	1.63	1.75	1.25	2.00	1.66
	Change hatch pos. easily/safely	1.63	1.50	1.25	2.25	1.66
	Noise interfere w/communication	1.75	2.00	1.00	1.75	1.63
	Try to dismount after long ride	1.75	1.25	1.50	2.00	1.63
	Exposed hydraulic line:handhold	2.75	1.25	1.00	1.50	1.63
	Items jammed under turret	2.38	1.25	1.50	1.25	1.59
	Access to personal weapon	2.25	1.00	1.25	1.75	1.56
	Adequacy/access to safety equip	2.25	.75	1.25	2.00	1.56
	Headset/helmet dismount probs.	2.25	1.00	1.25	1.50	1.50
	Amount of periscope padding	2.25	1.00	1.50	1.25	1.50
	Ability to operate w/MOPP gear	2.00	1.50	1.25	1.25	1.50
Minor	Fumes from vehicle heater	2.25	1.00	1.00	1.67	1.48
	Ramp operations/obstructions	1.88	1.00	1.25	1.75	1.47
	Other fumes from inside veh.	2.25	1.00	.75	1.75	1.44
	Loose items/equip on floor	1.75	1.25	1.50	1.25	1.44
	Exposed electric cable: handhold	2.50	1.25	1.00	1.00	1.44
	Pers. gear damage: poor storage	1.63	1.50	1.25	1.25	1.41
	Length of headset cord	2.25	1.50	1.00	.75	1.38
	Sharp points on camrail	2.25	1.25	.25	1.50	1.31
	Loading plan of vehicle	2.50	.75	1.00	1.00	1.31



## COMMON CREW ISSUES (CON'T)

TOE Unit Soldier Ratings Summary

PROBLEM	ISSUE	SQUAD LEADER	GUNNER	DRIVER	LOADER	MEAN RATING
Minor	Hearing prob. after noise stop	2.00	1.00	.75	1.50	1.31
	Headset cord in way of job	1.38	1.00	1.00	1.75	1.28
	Motion sick: veh. buttoned up	1.75	.50	1.50	1.00	1.25
	Unsafe hatch interlock failure	2.00	1.25	.75	1.00	1.25
	Motion sick: long, fast ride	1.75	.50	1.50	1.25	1.25
	Comms w/other crew, inside	1.63	1.25	.50	1.50	1.22
	Equip. damage: poor storage	1.86	1.25	1.00	.75	1.22
	Lack of air when buttoned up	2.00	.50	1.00	1.50	1.19
	Prep to move after firing	1.50	.75	1.00	1.50	1.19
	Lack of covers for sights	1.88	1.25	.50	1.00	1.16
	Activating controls accidentally	2.25	.75	.50	1.00	1.13
	Ability to operate w/cld wxgear	1.50	1.75	.75	.50	1.13
	Broken headsets	1.33	1.00	1.25	.75	1.08
	Adequacy of maint. manuals	1.88	.50	.66	1.25	1.07
	Foot catching under turret	2.13	.75	.75	.50	1.03
	Hatch cover latches loosening	2.00	1.00	.25	.75	1.00
	Coordinating w/SL, inside	1.38	.75	.50	1.25	.97
	Sufficient # of hand holds	1.38	0.00	.75	1.50	.91
	Force to lock/un night sight	1.63	.25	.50	1.00	.85
	Fumes from missile firing	.50	.25	1.00	.75	.63
	Overpressure during firing	.75	.25	.33	1.00	.58
	Adequacy of missile straps	1.25	.25	0.00	.50	.50

No

None.

## COMMON CREW ISSUES (CON'T)

TOE Unit Soldier Ratings--Squad Leader

PROBLEM	MEAN RATING	ISSUE
Serious	3.000	Vulnerability while boresighting/collimating.
	3.000	Low temperature in vehicle.
	3.000	Crowding/cramped space in vehicle.
	2.880	Ability to move out without reboresighting/collimating.
	2.750	Clothing/web gear snagging as entering/leaving vehicle.
	2.750	Vibration in vehicle.
	2.750	Exposed hydraulic fluid lines used as handholds.
	2.750	Ability to care for injured persons in vehicle.
	2.750	Amount of safety/crash padding in the vehicle.
	2.750	Malfunctions of heater.
	2.630	Adequacy of back support of your seat.
	2.630	Being bounced around vehicle.
	2.500	Getting over/passing by other's seats.
	2.500	Too little head room.
	2.500	Too little hip/shoulder room.
	2.500	Exposed electrical cables used as hand holds.
	2.500	Operating backup hydraulic pump.
	2.500	Objects sticking out in vehicle that are safety hazards.
	2.500	Loading plan of vehicle.
	2.500	Adequacy of lighting.
	2.500	Too little leg room.
	2.500	Headset/helmet comfort.
	2.500	Getting out of vehicle from your seat.
	2.500	Machinegun cannot be used while operating the launcher.
Moderate	2.380	Adjusting your seat to be comfortable.
	2.380	Things getting jammed underneath turret on the vehicle floor.
	2.250	Fumes from vehicle heater.
	2.250	Sharp points on camrail on gunner's cupola.
	2.250	Adequacy of lighting at your duty position.
	2.250	Amount of padding on the periscope.
	2.250	General discomfort when in vehicle for a long time.
	2.250	Fumes from other sources inside the vehicle.
	2.250	High temperature in vehicle.
	2.250	General discomfort when in vehicle for a short time.
	2.250	Ability to get individual weapon when required.
	2.250	Adequacy/access of safety emergency equipment.
	2.250	Getting into your seat.
	2.250	Activating controls accidentally.
	2.250	Length of headset cord.
	2.250	Headset/helmet difficulties during dismount.
	2.130	Getting foot caught underneath the rotating turret.
	2.000	Latches working loose on hatch covers.
	2.000	Not enough air when the vehicle is buttoned-up.
	2.000	Noise causing hearing problems after last noise has ended.
	2.000	Ability to operate ITV while wearing MOPP gear.
	2.000	Noise annoying to you.
	2.000	Closeness of squad leader's position to the turret.
	2.000	Unsafe conditions for missile firing due to failure of hatch interlock system.
	1.880	Discomfort riding at high speeds.
	1.880	Adequacy of maintenance manuals.
	1.880	Lack of covers for sights.
	1.880	Ramp operations or obstructions.
	1.860	Damage to weapons/equipment due to inadequate storage.
	1.750	Feeling motion sick when riding at high speeds for long periods.
	1.750	Feeling motion sick when riding buttoned-up.
	1.750	Discomfort when riding at slow speeds.

## COMMON CREW ISSUES (CON'T)

TOE Unit Soldier Ratings--Squad Leader

PROBLEM	MEAN RATING	ISSUE
Moderate	1.750	Loose items/equipment on the floor.
	1.750	Noise causing trouble hearing communications.
	1.750	Trying to dismount after being in vehicle for some time.
	1.750	Feeling disoriented while riding in vehicle.
	1.630	Damage to personal gear due to inadequate storage.
	1.630	Force needed to lock/unlock nightsight to/from daysight.
	1.630	Malfunctions of radio/intercom systems.
	1.630	Changing hatch positions easily and safely.
	1.500	Ability to operate ITV with cold weather gear.
	1.500	Preparing to move away from firing after impact.
Minor	1.380	Sufficient number of handholds.
	1.380	Hearing/communications with SL and other while inside vehicle.
	1.380	Coordinating with SL while inside vehicle.
	1.380	Headset cord in way while doing my job.
	1.330	Broken headsets.
	1.250	Adequacy of missile storage straps in keeping missiles from moving, being damaged or falling from racks.
	0.750	Overpressure during missile firing.
	0.500	Fumes from missiles during live fire.
No		None.

## COMMON CREW ISSUES (CON'T)

TOE Unit Soldier Ratings--Gunner

PROBLEM	MEAN RATING	ISSUE
Serious	3.000	Malfunctions of heater.
	2.750	Amount of safety/crash padding in vehicle.
Moderate	2.250	Adequacy of back support of your seat.
	2.000	High temperature in vehicle.
	2.000	Vulnerability during boresighting/collimating.
	2.000	Being bounced around the vehicle.
	2.000	General discomfort when in vehicle for a long time.
	2.000	Noise causing trouble hearing communications.
	2.000	Ability to care for injured persons in vehicle.
	2.000	Low temperature in vehicle.
	1.750	Vibration in vehicle.
	1.750	Getting over/passing by other's seats.
	1.750	Closeness of SL's position to turret.
	1.750	Ability to operate ITV while wearing cold weather gear.
	1.750	Malfunctions of radio/intercom systems.
	1.750	Crowding/cramped space in vehicle.
	1.500	Objects sticking out in vehicle that are safety hazards.
	1.500	Adjusting your seat to be comfortable.
	1.500	Discomfort while riding at high speeds.
	1.500	Damage to personal gear due to inadequate storage.
	1.500	Getting out of vehicle from your seat.
	1.500	Too little head room.
	1.500	Getting into your seat.
	1.500	Ability to move without reboresighting/collimating.
	1.500	Ability to operate the ITV while wearing MOPP gear.
	1.500	Length of headset cord.
	1.500	Changing hatch positions easily and safely.
Minor	1.250	Loose items/equipment on floor.
	1.250	Things getting jammed underneath turret on vehicle floor.
	1.250	Exposed electrical cables used as handholds.
	1.250	Exposed hydraulic fluid lines used as handholds.
	1.250	Damage to weapons/equipment due to inadequate storage.
	1.250	Noise annoying to you.
	1.250	Unsafe conditions for missile firing due to failure of hatch interlock system.
	1.250	Operating backup hydraulic pump.
	1.250	Trying to dismount after being in the vehicle for some time.
	1.250	Lack of covers for sights.
	1.250	Feeling disoriented when riding in vehicle.
	1.250	Clothing/web gear snagging as entering/leaving vehicle.
	1.250	Headset/helmet comfort.
	1.250	Machinegun cannot be used while operating launcher.
	1.250	Sharp points on camrail around gunner's cupola.
	1.000	Fumes from vehicle heater.
	1.000	Latches working loose on hatch covers.
	1.000	Adequacy of lighting at your duty position.
	1.000	Adequacy of lighting inside the vehicle.
	1.000	Amount of padding on the periscope.
	1.000	Too little hip/shoulder room.
	1.000	Discomfort while riding at slow speeds.
	1.000	General discomfort when in vehicle for a short time.
	1.000	Noise causing hearing problems after the last noise ended.
	1.000	Ability to get individual weapon when required.
	1.000	Ramp operations/obstructions.
	1.000	Too little leg room.
	1.000	Fumes from other sources inside the vehicle.
	1.000	Broken headsets.
	1.000	Headset/helmet difficulties during dismount.

## COMMON CREW ISSUES (CON'T)

TOE Unit Soldier Ratings--Gunner

PROBLEM	MEAN RATING	ISSUE
Minor	1.000	Headset cord in way while doing my job.
	0.750	Communications with SL and others while inside the vehicle.
	0.750	Getting foot caught beneath rotating turret.
	0.750	Adequacy/access of safety/emergency equipment.
	0.750	Loading plan of vehicle.
	0.750	Preparing to move away from firing after impact.
	0.750	Activating controls accidentally.
	0.750	Coordinating with SL inside vehicle.
	0.500	Not enough air when the vehicle is buttoned-up.
	0.500	Feeling motion sick while riding at high speed for a long time.
	0.500	Feeling motion sick when buttoned-up.
	0.500	Adequacy of maintenance manuals.
No	0.250	Adequacy of missile storage straps in keeping missiles from moving, being damaged, or falling from racks.
	0.250	Force required to lock/unlock nightsight to/from daysight.
	0.250	Overpressure during missile firing.
	0.250	Fumes from live missile firing.
	0.000	Sufficient number of handholds.

## COMMON CREW ISSUES (CON'T)

TOE Unit Soldier Ratings--Driver

PROBLEM	MEAN RATING	ISSUE
Serious	3.000	Crowding/cramped space in vehicle.
	3.000	Too little leg room.
	2.750	Too little hip/shoulder room.
	2.500	Malfunctions of heater.
	2.500	Amount of safety/crash padding.
Moderate	2.250	Too little head room.
	2.250	Discomfort riding at high speeds.
	2.250	General discomfort when in vehicle for a long time.
	2.000	Being bounced around vehicle.
	2.000	Adequacy of back seat support of your seat.
	2.000	Low temperature in vehicle.
	2.000	Getting into your seat.
	2.000	Ability to move out without reboresighting/collimating.
	2.000	Getting over/passing by other's seats.
	2.000	High temperature in vehicle.
	1.750	Vibration in vehicle.
	1.750	Adjusting your seat to be comfortable.
	1.750	Machinegun cannot be used while operating launcher.
	1.750	Closeness of SL's position to the turret.
	1.750	Noise annoying to you.
	1.750	Clothing/web gear snagging while entering/leaving vehicle.
	1.750	General discomfort when in vehicle a short time.
	1.750	Feeling disoriented while riding in vehicle.
	1.750	Vulnerability while boresighting/collimating.
	1.500	Loose items/equipment on floor.
	1.500	Feeling motion sick when riding at high speed for long periods.
	1.500	Feeling motion sick when buttoned-up.
	1.500	Amount of padding on periscope.
	1.500	Discomfort while riding at slow speeds.
	1.500	Adequacy of lighting at your duty position.
	1.500	Things getting jammed underneath turret on vehicle floor.
	1.500	Trying to dismount after being in the vehicle for some time.
	1.500	Ability to care for injured persons inside vehicle.
Minor	1.250	Headset/helmet difficulties during dismount.
	1.250	Objects sticking out in vehicle that are safety hazards.
	1.250	Adequacy of lighting inside vehicle.
	1.250	Damage to personal gear due to inadequate storage.
	1.250	Ability to get individual weapon when required.
	1.250	Adequacy/access to safety/emergency equipment.
	1.250	Operating backup hydraulic pump.
	1.250	Ability to operate ITV with MOPP gear.
	1.250	Malfunctions of radio/intercom systems.
	1.250	Ramp operations/obstructions.
	1.250	Changing hatch positions easily and safely.
	1.250	Broken headsets.
	1.000	Fumes from vehicle heater.
	1.000	Not enough air when vehicle is buttoned-up.
	1.000	Exposed electrical cables used as handholds.
	1.000	Exposed hydraulic fluid lines used as handholds.
	1.000	Getting out of vehicle from your seat.
	1.000	Damage to weapons/equipment due to inadequate storage.
	1.000	Noise causing trouble hearing communications.
	1.000	Preparing to move away from firing after impact.
	1.000	Length of headset cord.
	1.000	Headset cord in way while doing my job.

## COMMON CREW ISSUES (CON'T)

TOE Unit Soldier Ratings--Driver

PROBLEM	MEAN RATING	ISSUE
Minor	1.000	Fumes from live missile firing.
	1.000	Loading plan of vehicle.
	0.750	Fumes from other sources inside vehicle.
	0.750	Getting foot caught beneath rotating turret.
	0.750	Sufficient number of handholds.
	0.750	Noise causing hearing problems after last noise end.
	0.750	Unsafe conditions for missile firing due to failure of hatch interlock system.
	0.750	Ability to operate ITV while wearing cold weather gear.
	0.750	Headset/helmet comfort.
	0.660	Adequacy of maintenance manuals.
	0.500	Lack of covers for sights.
	0.500	Force needed to lock/unlock nightsight to/from daysight.
	0.500	Activating controls accidentally.
	0.500	Hearing/communications with SL and others while inside the vehicle.
	0.500	Coordinating with SL while inside vehicle.
No	0.330	Overpressure during live missile firing.
	0.250	Loosening of latches on hatch covers.
	0.250	Sharp points on camrail around gunner's cupola.
	0.000	Adequacy of missile storage straps in keeping missiles from moving, being damaged, or falling from racks.

## COMMON CREW ISSUES (CON'T)

TOE Unit Soldier Ratings--Loader

PROBLEM	MEAN RATING	ISSUE
Serious	3.000	General discomfort when in vehicle for long periods.
	3.000	Amount of safety/crash padding in vehicle.
	3.000	Clothing/web gear snagging upon entering/leaving vehicle.
	3.000	Low temperature in vehicle.
	2.750	Crowding/cramped space in vehicle.
	2.750	Adjusting your seat to be comfortable.
	2.750	Discomfort riding at high speeds.
	2.750	Machinegun cannot be used while using launcher.
	2.750	Feeling disoriented while riding in vehicle.
	2.750	Malfunctions of heater.
	2.750	Adequacy of seat back support.
	2.750	Getting over/passing by other's seats.
	2.750	Being bounced around vehicle.
	2.500	Objects sticking out in vehicle that are safety hazards.
	2.500	Ability to care for injured persons in vehicle.
	2.500	Too little leg room.
	2.500	Discomfort riding at slow speeds.
	2.500	Too little head room.
	2.500	Vibration in vehicle.
	2.500	Vulnerability while boresighting/collimating.
	2.500	Noise annoying to you.
Moderate	2.250	Too little hip/shoulder room.
	2.250	Adequacy of lighting inside vehicle.
	2.250	Adequacy of lighting at your duty position.
	2.250	General discomfort while riding in vehicle for a short time.
	2.250	Getting into your seat.
	2.250	Headset/helmet comfort.
	2.250	Ability to move out without reboresighting/collimating.
	2.250	Changing hatch positions easily and safely.
	2.000	High temperature in vehicle.
	2.000	Trying to dismount after being in vehicle for some time.
	2.000	Adequacy/access of safety/emergency equipment.
	2.000	Malfunctions of radio/intercom system.
	1.750	Getting out of the vehicle from your seat.
	1.750	Noise causing trouble hearing communications.
	1.750	Ability to get to personal weapon when required.
	1.750	Operating backup hydraulic pump.
	1.750	Fumes from other sources from inside vehicle.
	1.750	Ramp operations/obstructions.
	1.750	Headset cord in way while doing my job.
	1.670	Fumes from vehicle heater.
	1.500	Sharp points on camrail around the gunner's cupola.
	1.500	Not enough air while vehicle is buttoned-up.
	1.500	Exposed hydraulic fluid lines used as handholds.
	1.500	Sufficient number of handholds.
Minor	1.500	Noise causing hearing problems after last noise has ended.
	1.500	Closeness of SL position to the turret.
	1.500	Preparing to move away from firing after impact.
	1.500	Hearing/communications with SL or others while inside vehicle.
	1.500	Headset/helmet difficulties during dismount.
	1.250	Loose items/equipment on floor.
	1.250	Feeling motion sick while riding at high speed for long periods.
	1.250	Amount of padding on periscope.
	1.250	Damage to personal gear due to inadequate storage.
	1.250	Adequacy of maintenance manuals.
	1.250	Ability to operate ITV while wearing MOPP gear.



## COMMON CREW ISSUES (CON'T)

TOE Unit Soldier Ratings--Loader

PROBLEM	MEAN RATING	ISSUE
Minor	1.250	Coordinating with SL while inside vehicle.
	1.000	Feeling motion sick when buttoned-up.
	1.000	Exposed electrical cables used as handholds.
	1.000	Unsafe conditions for missile firing due to failure of hatch interlock system.
	1.000	Force required to lock/unlock nightsight to/from daysight.
	1.000	Things getting jammed underneath turret on vehicle floor.
	1.000	Loading plan of vehicle.
	1.000	Overpressure during missile firing.
	1.000	Activating controls accidentally.
	1.000	Lack of covers for sights.
	0.750	Latches working loose on hatch covers.
	0.750	Damage to weapons/equipment due to inadequate storage.
	0.750	Length of headset cord.
	0.750	Broken headsets.
	0.750	Fumes from missiles during live fire.
	0.500	Getting foot caught beneath the rotating turret.
	0.500	Adequacy of missile storage straps in keeping missiles from moving, being damaged, or falling from racks.
	0.500	Ability to operate ITV wearing cold weather gear.
No		None.

## COMMON CREW ISSUES (CON'T)

Instructor Ratings

PROBLEM	MEAN RATING	ISSUE
Serious	2.875	Clothing, web gear snagging entering/leaving vehicle.
	2.875	Vulnerability while boresighting/collimating
	2.875	Exposed electrical cables used as hand holds.
	2.875	Being bounced around vehicle.
	2.875	Crowding/cramped space in vehicle.
	2.750	Exposed hydraulic fluid lines used as hand holds.
	2.750	High temperature inside vehicle.
	2.750	Machinegun cannot be used when operating launcher.
	2.750	Ability to care for injured persons in vehicle.
	2.750	Loose items/equipment on the floor.
	2.750	Adequacy of maintenance manuals.
	2.625	Vibration in vehicle.
	2.625	Too little head room.
	2.625	Noise causing trouble hearing communications.
	2.625	Things getting jammed underneath turret on floor of vehicle.
	2.625	Adequacy of back support of your seat.
	2.625	General discomfort when in the vehicle for long time periods.
	2.625	Amount of safety crash padding in vehicle.
	2.625	Ability to operate ITV wearing MOPP gear.
	2.625	Objects sticking out in vehicle that are safety hazards.
	2.625	Low temperature inside vehicle.
	2.625	Too little hip or shoulder room.
	2.500	Broken headsets.
	2.500	Malfunctions of heater.
Moderate	2.375	Getting over or passing by other's seats.
	2.375	Latches working loose on hatch covers.
	2.375	Malfunctions of radio/intercom system.
	2.375	Too little leg room.
	2.375	Feeling disoriented when you are riding in the vehicle.
	2.375	Adjusting your seat to be comfortable.
	2.375	Ability to operate ITV wearing cold weather gear.
	2.375	Amount of padding on the periscopes.
	2.250	Noise causing hearing problems that last after noise has stopped.
	2.250	Closeness of the Squad Leader's position to turret.
	2.250	Changing hatch positions easily and safely.
	2.250	Ability to get individual weapon when required.
	2.250	Damage to weapons and equipment due to inadequate storage.
	2.250	Headset cord in way while doing my job.
	2.125	Adequacy of lighting inside vehicle.
	2.125	Not enough air when the vehicle is buttoned up.
	2.125	Adequacy of lighting at your duty position.
	2.125	Ability to move without reboresighting/collimating.
	2.125	Activating controls accidentally.
	2.125	Fumes from vehicle heater.
	2.125	Damage to personal gear due to inadequate storage.
	2.000	Getting into your seat.
	2.000	Escaping from the vehicle from your seat.
	2.000	Reliability of vehicle.
	2.000	Operating the backup hydraulic pump.
	2.000	Unsafe conditions for missile firing due to failure of hatch interlock system.
	2.000	Getting out of the vehicle from your seat.
	2.000	Discomfort riding at high speeds.
	1.875	Headset/helmet difficulties during dismount.
	1.875	Sharp points on camrail around gunner's cupola.
	1.875	Hearing/communicating with the Squad Leader or others while inside the vehicle.
	1.875	Trying to dismount after being in the vehicle for some period of time.
	1.875	Loading plan of vehicle.
	1.875	Adequacy and accessibility of safety/emergency equipment.

## COMMON CREW ISSUES (CON'T)

Instructor Ratings

PROBLEM	MEAN RATING	ISSUE
Moderate	1.750	General discomfort when in the vehicle for short time periods.
	1.750	Sufficient number of hand holds.
	1.750	Coordinating with the Squad Leader while inside the vehicle.
	1.625	Lack of covers for sights.
	1.625	Fumes from other sources inside the vehicle.
	1.500	Feeling motion sick when riding long periods at high speeds.
	1.500	Preparing to move away from the firing area after missile impact.
	1.500	Length of headset cord.
Minor	1.500	Discomfort riding at slow speeds.
	1.375	Feeling motion sick when buttoned up.
	1.375	Noise annoying to you.
	1.375	Over pressure during missile firing.
	1.250	Getting foot caught beneath the rotating turret.
	1.250	Adequacy of missile storage straps in keeping missiles from moving, being damaged, or falling from racks.
	1.125	Ramp operations or obstructions.
	0.875	Force needed to lock/unlock the night sight to/from day sight.
No	0.750	Fumes from missiles during live fire.
	0.750	Headset/helmet comfort.
No	None.	

**SQUAD LEADER ISSUES**  
**TOE Unit Soldier Ratings--Squad Leader**

PROBLEM	MEAN RATING	ISSUE
Serious	3.000	Seeing through the squad leader's Periscope (SLP) at night.
	3.000	Seeing through the SLP while in full defilade.
	3.000	Seeing through the SLP when the driver's hatch is open.
	2.750	Seeing through the SLP in bad weather or when dust, smoke or haze are present.
	2.750	Keeping track of your full area of battlefield responsibility using the SLP.
	2.750	Navigating and controlling from the squad leader's (SL) seat.
	2.750	Navigating and controlling from the loader's hatch.
	2.750	Being able to see well enough to do your job.
Moderate	2.250	Seeing through the SLP while the vehicle is moving.
	2.250	Seeing through the SLP when looking in the direction of launcher.
	2.250	Staying seated on the SL's seat while vehicle is moving.
	2.250	Moving from SL's station to the turret during travel.
	2.000	Seeing through the SLP when glare/brightness is present.
	2.000	Estimating range to a target using the SLP.
	2.000	Bumping into the missile guidance set J-1 connector when sitting in the SL's seat.
	1.500	Keeping rain, snow, fog, dirt, mud, debris, etc. off SLP lenses.
Minor	1.500	Comfort while using the SLP.
	1.250	External radio antenna interfering with turret motion.
	1.000	Controlling the driver's activities while dismounted.
	1.000	Controlling the gunner's activities while dismounted.
	0.860	Controlling the driver's activities while in vehicle.
	0.860	Directing gunner to a target you have located.
	0.750	Communications with other vehicles to coordinate targets while in the vehicle.
	0.750	Attaching external radio antenna.
No	0.750	Knowing how to operate each crewman's position/equipment.
	0.250	External radio antenna interference with missile launcher load/unload.
	0.000	Crewmember access to the smoke grenade launcher switch.
	0.000	Operating the radio from the squad leader's seat.

**SQUAD LEADER ISSUES**  
**Instructor Ratings**

PROBLEM	MEAN RATING	ISSUE
Serious	2.875	Seeing through the squad leader's Periscope (SLP) at night.
	2.750	Being able to see well enough to do your job.
	2.750	Seeing through the SLP in bad weather or when dust, smoke, or haze are present.
	2.625	Seeing through the SLP when driver's hatch is open.
	2.625	Keeping track of your full area of battlefield responsibility using the SLP.
Moderate	2.375	Navigating and controlling from loader's hatch.
	2.375	Seeing through the SLP while in full defilade.
	2.375	Moving from squad leader's station to the turret during travel.
	2.375	Seeing through the SLP when looking in the direction of the launcher.
	2.250	Navigating and controlling from the squad leader's seat.
	2.250	Staying seated on the squad leader's seat while vehicle is moving.
	2.250	Seeing through the SLP while the vehicle is moving.
	2.250	Seeing through the SLP when glare/brightness is present.
	1.875	Comfort while using the SLP.
	1.750	Bumping into the missile guidance set J-1 connector when sitting in the squad leader's seat.
	1.750	Controlling the driver's activities while you are dismounted.
	1.500	Keeping rain, snow, fog, dirt, mud, debris, etc. off the SLP lenses.
Minor	1.375	Estimating range to a target using the SLP.
	1.250	Controlling the driver's activities while you are in the vehicle.
	1.000	Communicating with other vehicles to coordinate targets, etc, while you are in the vehicle.
	1.000	Crew member access to the smoke grenade launcher switch.
	1.000	Controlling gunner's actions while you are dismounted.
	0.875	External radio antenna interfering with turret motion.
	0.875	Operating the radio from the squad leader's seat.
	0.875	Directing the gunner to a target you have located.
No	0.750	External radio antenna interfering with missile launcher loading/unloading.
	0.375	Attaching the external radio antenna.
	0.250	Knowing how to operate each crewman's position/equipment.

# GUNNER ISSUES

## TOE Unit Soldier Ratings--Gunner

PROBLEM	MEAN RATING	ISSUE
Serious	2.500	Eye strain from using a single eyepiece.
	2.500	Exposure while firing the machinegun.
Moderate	2.250	Brass being deflected to the inside of the vehicle during machinegun operations.
	2.250	Inability to turn night sight on and off.
	1.750	Amount of "deadband" in the hand controls.
	1.750	Being too high in the hatch while standing on the gunner's seat.
	1.500	Tracking while heatwaves visible.
	1.500	Fogging of image transfer assembly.
	1.500	Red lights indicating "warnings" as well as "go" conditions.
	1.500	Reading the azimuth indicator while traversing the turret.
Minor	1.500	Covering the necessary area with the machinegun.
	1.250	Not being able to see who or what is on top of the vehicle.
	1.250	Sliding off the gunner's seat while moving.
	1.250	Blind spots when the launcher is stowed.
	1.000	Adjusting the night sight.
	1.000	Accessing and using the missile guidance set.
	1.000	Operating machinegun.
	1.000	Operating control panel switches while using sights.
	1.000	Reading azimuth indicator in the dark.
	1.000	Operating turret in the dark.
	1.000	Operating turret when backup hydraulic pump is being used.
	0.750	Hazards during high/low temperature operations.
	0.750	Tracking in dust, smoke and haze conditions.
	0.750	Loading and reloading the machinegun.
	0.750	Putting machinegun into operation or stowing.
	0.750	Adequacy of the night sight remote control.
	0.500	"Satisfying the lights" on the control panel before being able to alter operations on the control panel.
	0.500	Confusion with lights on the control panel.
No	0.500	Reading azimuth indicator as eyes adjust to outside light level.
	0.500	Focusing the night sight.
	0.500	Standing on the gunner's seat during travel.
	0.250	Operating trigger switches with thumbs vs. index fingers.
	0.000	Operating slew switches with index fingers instead of thumbs.

# GUNNER ISSUES

## Instructor Ratings

PROBLEM	MEAN RATING	ISSUE
Serious	None.	
Moderate	2.375	Blind spots when the launcher is stowed.
	2.375	Not being able to see who or what is on top of the vehicle.
	2.250	Inability to turn night sight on or off.
	2.125	Fogging of image transfer assembly.
	2.000	Operating the turret when backup hydraulic pump being used.
	2.000	Exposure while firing the machinegun.
	2.000	Tracking while heat waves visible.
	2.000	Eye strain from using a single eyepiece.
	2.000	Tracking in dust, smoke, or haze.
	1.750	Hazards during high or low temperature operations.
	1.625	Brass being deflected to inside of vehicle when machinegun is in operation.
	1.625	Being too high in the hatch while standing on the gunner's seat.
	1.500	Accessing and using the missile guidance set.
	1.500	Reading azimuth indicator while traversing the turret.
Minor	1.375	Covering the necessary area with the machinegun.
	1.250	Amount of "dead band" in hand control.
	1.250	Reading azimuth indicator as eyes adjust to outside light level.
	1.250	Focusing the night sight.
	1.250	Adjusting the night sight (brightness, contrast, or field of view).
	1.125	Adequacy of the night sight remote controls.
	1.125	Operating machinegun.
	1.125	Reading azimuth indicator in the dark.
	1.125	Sliding off the gunner's seat while vehicle is moving.
	1.000	"Satisfying the lights" on the control panel before being able to alter operation of the launcher.
	0.875	Red lights indicating "warnings" as well as "go" conditions.
	0.875	Operating control panel switches while using sights.
	0.875	Standing on the gunner's seat during travel.
	0.750	Putting the machinegun into operation or stowing it.
	0.750	Loading and reloading the machinegun.
	0.750	Operating the turret in the dark.
No	0.375	Operating slew switches with index fingers instead of thumbs.
	0.375	Operating trigger switches with thumbs instead of index fingers.
	0.250	Confusion with the lights on the control panel.

**DRIVER ISSUES**  
**TOE Unit Soldier Ratings--Driver**

<b>PROBLEM</b>	<b>MEAN RATING</b>	<b>ISSUE</b>
<b>Serious</b>	2.500	Seeing through the driver's periscope at night when buttoned up.
<b>Moderate</b>	2.250	Driving at night with the blackout lights.
	2.000	Seeing through the driver's periscope when in glare.
	2.000	Reaching components while working on engine compartment.
	1.750	Driving with the launcher erect.
	1.750	Seeing behind the vehicle.
<b>Minor</b>	1.250	Reaching any controls.
	1.250	Powering down the radios to start the vehicle.
	1.250	Seeing with the launcher in the stowed position.
	1.000	Weapons being fired near your hatch.
	1.000	Coordinating with the gunner when the SL is dismounted.
	0.750	Observing all controls/displays to drive.
	0.750	Seeing through driver's periscope in daylight when buttoned up.
	0.500	Reading any visual display.
	0.500	Operating any controls.
	0.500	Confusing fuel cutoff control and hand throttle.
	0.500	Steering the vehicle.
	0.500	Operating the brakes.
	0.500	Knowing where the launcher is pointed relative to vehicle front.
<b>No</b>	0.250	Operating the transmission.
	0.250	Center of gravity of the vehicle.
	0.250	Seeing with the hatch popped-up.
	0.250	Driving at night with the headlights.
	0.250	Adequacy of pitch/cant indicators in driver's compartment.
	0.250	Operating the turret during dismount operations.
	0.000	Getting the vehicle level enough to use the launcher.



**DRIVER ISSUES**  
**Instructor Ratings**

<b>PROBLEM</b>	<b>MEAN RATING</b>	<b>ISSUE</b>
<b>Serious</b>	2.875	Seeing through the driver's periscopes when they are in the sun's glare.
	2.750	Seeing through the driver's periscopes at night when buttoned up.
	2.625	Seeing behind the vehicle.
	2.625	Driving with the launcher erect.
<b>Moderate</b>	2.375	Seeing through the driver's periscopes in daylight when buttoned up.
	2.375	Seeing with hatch popped-up.
	2.250	Driving at night with the blackout lights.
	2.250	Reaching components while working in the engine compartment.
	2.125	Operating the turret during dismounted operations.
	1.875	Seeing with launcher in stowed position.
	1.875	Center of gravity of the vehicle.
<b>Minor</b>	1.500	Powering down the radios to start the vehicle.
	1.375	Confusing fuel cutoff control and hand throttle control.
	1.375	Coordinating with the gunner when the squad leader is dismounted.
	1.250	Knowing where the launcher is pointed relative to the front of the vehicle.
	1.125	Weapon(s) being fired near your hatch.
	1.125	Observing all controls/displays necessary for driving.
	1.000	Adequacy of the pitch and cant indicators in the driver's compartment.
	0.875	Steering the vehicle.
	0.875	Getting the vehicle level enough for use of the launcher.
	0.625	Operating the brakes.
	0.625	Driving at night with the headlights.
	0.500	Operating the transmission.
	0.500	Reading any visual display.
<b>No</b>	0.375	Reaching any controls.
	0.375	Operating any controls.

**LOADER ISSUES**  
**TOE Unit Soldier Ratings--Loader**

<b>PROBLEM</b>	<b>MEAN RATING</b>	<b>ISSUE</b>
<b>Serious</b>		None.
<b>Moderate</b>	2.000	Adequacy of the missile latching system in assuring that the missile is loaded properly.
	2.000	Having enough space to load the launcher.
	2.000	Making observations from the cargo hatch.
	2.000	Stowed tripod blocking right field of view.
	1.750	Loading the ITV from inside the vehicle.
	1.750	Loading missiles at night.
	1.750	Noise in the vehicle during live fire.
	1.500	Closing and opening the cargo hatch.
<b>Minor</b>	1.330	Throwing missile casings out when side armor is erected.
	1.330	Loading smoke grenade launchers.
	1.330	Loading missiles when the ITV is not level.
	1.000	Exposure when loading/unloading the launcher.
	1.000	Danger loading/unloading ATWESS cartridges.
	0.750	Throwing missile casings out right side of vehicle.
	0.750	Throwing missile casings out left side of vehicle.
	0.500	Cargo hatch opening wide enough to load launcher easily.
<b>No</b>	0.000	Using the intercom box in its present location.

**LOADER ISSUES**  
**Instructor Ratings**

<b>PROBLEM</b>	<b>MEAN RATING</b>	<b>ISSUE</b>
<b>Serious</b>	2.500	Danger loading/unloading ATWESS cartridges.
<b>Moderate</b>	2.125	Making observations from the cargo hatch.
	2.125	Throwing missile casings out when side armor is erected.
	2.000	Having enough space to load the launcher.
	2.000	Stowed tripod blocking right field of view.
	2.000	Loading missiles at night.
	1.875	Loading the ITV from inside the vehicle.
	1.875	Adequacy of the missile latching system in assuring that the missile is loaded properly.
	1.750	Exposure when loading/unloading the launcher.
	1.625	Loading missiles when the ITV isn't level.
	1.625	Throwing missile casings out the right side of the ITV.
	1.625	Throwing missile casings out the left side of the ITV.
<b>Minor</b>	1.250	Noise in the vehicle during live firing.
	1.250	Cargo hatch opening wide enough to load the launcher easily.
	1.125	Loading smoke grenade launchers.
	0.875	Using the intercom box in its present location.
	0.750	Closing/opening the cargo hatch.
<b>No</b>		None.

## APPENDIX M

### HUMAN FACTORS ISSUES

#### Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
2.75	<p><b>Amount of safety crash padding in vehicle.</b></p> <p>"Safety crash padding and adequate hand holds were not provided to the extent desired by many of the participants." (Rushton et al., 1978, p. xiv)</p> <p>"Crew members in general wanted additional padding on the left rear bench seat and padding for the securing bolts on the metal straps restraining the fuel cell." (Rushton et al., 1978, p. 819)</p> <p>"Crew members indicated difficulties and hazards getting in and out of the turret, problems of exposed wiring and hydraulic lines, and the hazard of being thrown around and hitting things (sharp edges and knobs) while underway." (Smith et al., 1980, p. 23)</p>
2.75	<p><b>Malfunction of heater.</b></p> <p>"There were also numerous complaints about...heaters not working..." (Hammond &amp; Redden, 1984, p. 48)</p> <p>"The heater in the ITV was considered inadequate when it was working. However, the vast majority of the heaters were broken." (Hammond &amp; Redden, 1984, p. 53)</p> <p>"Drivers and section leaders did not know how to shut down the personnel heater. The heater is necessary for cold weather operation because the turret hydraulic system becomes sluggish or inoperative in cold temperatures. Improper operation can cause maintenance problems to develop. An inoperative heater is not currently a "dead line" item in the operator's manual." (Hammond, 1985, p. 12)</p>
2.63	<p><b>Crowding/cramped space in vehicle.</b></p> <p>"The SL's seat is too close to the gunner's platform assembly, and it adds to the congestion which makes it difficult for the SL and gunner to move to and from their respective positions." (Mock &amp; Hill, 1978, p. 66)</p> <p>"Cramped space was perceived as a serious problem because of the difficulty in reaching for personal weapons and the lack of space available for stowage of personal gear." (Rushton et al., 1978, p. xiv)</p> <p>"Operation with CBR gear was a serious problem because of the already cramped space." (Rushton et al., 1978, p. xv)</p> <p>"The Infantry crews stated there was too little space in the squad leader's station." (Corbett et al., 1979, p. ix)</p> <p>"Crew members expressed concern over the vehicle loading plans and the general lack of space in the vehicle." (Corbett et al., 1979)</p> <p>"Soldiers experienced considerable difficulty trying to perform their jobs in the cramped work area. They rated the amount of workspace provided in the ITV as bad (an average of 3.63 on the 7 point scale). This problem is compounded when the vehicle is combat loaded." (Hammond &amp; Redden, 1984, p. 50)</p> <p>"Crew members in the rear compartment have expressed concerns with the lack of storage space for mission essential equipment and personal gear. Some hazardous conditions result from this space problem. Loose equipment has become wedged under the turret base. Equipment, web gear in particular, gets tangled on exposed wiring and hydraulic lines. Ammunition stored on top of the battery box was seen as very dangerous." (Smith et al., 1980, p. 47)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
2.50	<p>Low temperature in vehicle.</p> <p>"ITV problem areas were: vibration, low temperature, being bounced around, and general discomfort when in the vehicle for a long time or riding at high speed." (Smith et al., 1980, p. 14)</p>
2.41	<p>Adequacy of seat back support.</p> <p>"The gunner's seat does not have a backrest and the gunner quickly becomes fatigued." (Mock &amp; Hill, 1978, p. 66)</p> <p>"The gunner's seat requires a back support." (Rushton et al., 1978, p. xv)</p> <p>"Bounced around - poor ride quality - no support for the middle back on seat." (Rushton et al., 1978, p. 792)</p> <p>"A backrest is needed (portable and easily removable) and a much better method for seat adjustment devised. The seat now often requires two men to adjust it." (Rushton et al., 1978, p. 821)</p> <p>"The gunners were concerned about the lack of a back support on their seat." (Corbett et al., 1979, p. 259)</p> <p>"The driver's seat was considered to be uncomfortable especially for long distance driving. The seat back is seldom used because it gets in the way when exiting the vehicle. (The seat back column also slows down egress.) When driving with the seat at its highest point, the driver's back hits the edge of the hatch before it hits the backrest and thus he receives no back support from the seat back. Several drivers reported hitting their heads when driving with the hatch closed because the seat would not adjust low enough. There were also comments that the seat should move forward more so it would be easier for the driver to reach the controls." (Hammond &amp; Redden, 1984, p. 51)</p>
2.38	<p>General discomfort when in the vehicle for long time periods.</p> <p>"Both the Infantry and Calvary had a problem with the general discomfort experienced when in the vehicle for long periods of time." (Corbett et al., 1979, p. ix)</p> <p>"A problem with the general discomfort experienced when in the vehicle for long periods of time." (Mock et al., 1979, p. 40)</p> <p>"Continuous operations in the cramped vehicle would prove to be extremely difficult because of lack of space." (Hammond &amp; Redden, 1984, p. 50)</p> <p>"The M113A1 is generally regarded as uncomfortable-the ITV is obviously no better. ITV problem areas were: vibration, low temperature, being bounced around, and general discomfort when in the vehicle for a long time or riding at high speed." (Smith et al., 1980, p. 14)</p>
2.35	<p>Being bounced around the vehicle.</p> <p>"Loss of vision is experienced during closed hatch movements due to bumping motion of ITV." (Rushton et al., 1978, p. 791)</p> <p>"Bounced around - poor ride quality - no support for the middle back on seat." (Rushton et al., 1978, p. 792)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
2.31	<p><b>Vulnerability while boresighting/collimating.</b></p> <p>"Crewmembers had to stand on the vehicle deck (fully exposed) or sit at the edge of the open cargo hatch (partially exposed) to accomplish boresighting, as opposed to standing inside the carrier and making adjustments through the open cargo hatch (minimum exposure)." (Mock &amp; Hill, 1978, p. 32)</p>
2.25	<p><b>Getting over or passing by other's seats.</b></p> <p>"As a result, test players commented that the squad leaders acted as gunners after a move because it took too long for the gunner and squad leader to exchange positions." (Mock &amp; Hill, 1978, p. 29)</p> <p>"Storage is a concern of drivers as is the placement of the track commander's seat. This seat adds to the difficulty of entry and egress from the driver's seat through the crew compartment." (Rushton et al., 1978, p. 820)</p> <p>"Additional problems in the ITV were the ability to get over or by other crew members seats..." (Smith et al., 1980, p.14)</p>
2.25	<p><b>Too little leg room.</b></p> <p>"No leg room." (Rushton et al., 1978, p. 792)</p> <p>"There is also very little leg and arm room available." (Hammond &amp; Redden, 1984, p. 50)</p> <p>"...the gunner's feet often strike the squad leader if he is at his station." (Smith et al., 1980, p. 44)</p>
2.19	<p><b>Ability to care for injured persons in vehicle.</b></p> <p>"Soldiers experienced considerable difficulty trying to perform their jobs in the cramped work area. They rated the amount of workspace provided in the ITV as bad (an average of 3.63 on the 7 point scale). This problem is compounded when the vehicle is combat loaded." (Hammond &amp; Redden, 1984, p. 50)</p>
2.19	<p><b>Vibration in vehicle.</b></p> <p>"Loss of vision is experienced during closed hatch movements due to bumping motion of ITV." (Rushton et al., 1978, p. 791)</p> <p>"Vibration amplitudes for right and left missiles in the launch tubes (stowed configuration) are significantly higher on ITV D ("improved suspension") than on ITV A (current suspension system) by factors ranging from 1.2 to 2.4. The significance of these higher vibration levels should be further analyzed by PM TOW to assure that they represent no damage threat to the TOW missile." (Robinson, 1978, p. 4)</p> <p>"Vehicle vibration was rated to be extreme. It often caused stowed equipment to vibrate loose and to fall to the floor." (Hammond &amp; Redden, 1984, p. 53)</p>
2.19	<p><b>Too little head room.</b></p> <p>"Tall soldiers complain of constantly bumping their heads on vehicle components (i.e. hydraulic lines, etc.)..." (Hammond &amp; Redden, 1984, p. 50)</p> <p>"Several drivers reported hitting their heads when driving with the hatch closed because the seat would not adjust low enough." (Hammond &amp; Redden, 1984, p. 51)</p>

## HUMAN FACTORS ISSUES (CON'T)

### Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
2.19	<p><b>Clothing, web gear snagging entering/leaving vehicle.</b></p> <p>"Clothing and gear snagging during vehicle ingress/egress was a problem because of sharp edges and exposed hydraulic lines." (Rushton et al., 1978, p. xv)</p> <p>"Both the Infantry and the Calvary had a problem with their clothing and web gear snagging when entering or leaving the vehicle." (Corbett et al., 1979, p. ix)</p> <p>"...a problem with their clothing and web gear snagging when entering or leaving the vehicle." (Mock et al., 1979, p. 40)</p> <p>"NBC clothing and LBE often snag on items inside the vehicle which slows down ingress and egress and at times accidentally activate controls." (Hammond &amp; Redden, 1984, p. 50)</p> <p>"Web gear and heavy clothing gets caught on exposed wiring and lines." (Smith et al., 1980, p. 14)</p>
2.16	<p><b>Ability to move without reboresighting/collimating.</b></p> <p>"However, crewmembers considered moderate to serious problems existed with boresighting procedures, frequency of boresighting, ability to keep the system boresighted, and the ability to move to a new position and fire without a requirement for a new boresight." (Mock &amp; Hill, 1978, p. 32)</p> <p>"The boresight retention data show that boresight is frequently lost for the day sight system and more frequently lost for the night sight system." (Rushton et al., 1978, p. v)</p> <p>"Boresighting was perceived as a serious problem due to the required frequency of boresighting and the inability to fire after movement without reboresighting." (Rushton et al., 1978, p. xv)</p> <p>"Boresighting was perceived as a serious problem due to the required frequency of boresighting and the inability to fire after movement without reboresighting." (Corbett et al., 1979, p. x)</p> <p>"The least reliability was experienced with the day sight and night sight missile guidance set combination. Most commonly, crews would complain of the lack of ability to boresight the day sight and night sight, although they had successfully boresighted only minutes before. Exact cause of the problems were difficult to determine due to the requirements to replace the day sight and the MGS in pairs. The DS repairmen tested the individual components which often checked out as operational." (Corbett et al., 1979, p. 62)</p> <p>"This data shows that the boresight cannot be maintained during vehicle movement." (Robinson, 1978, p. 5)</p> <p>"The greatest weakness according to those interviewed is the reliability of the weapons system. ... They repeatedly expressed concerns that the weapons system was too sensitive to the wear and tear of tactical situations." (Hammond &amp; Redden, 1984, p. 48)</p> <p>"The continuous boresighting requirements and the collimator used to make the adjustments concern the entire crews." (Smith et al., 1980, p.45)</p>
2.12	<p><b>Too little hip/shoulder room.</b></p> <p>"The infantry crews stated there was too little space in the SL's station." (Corbett et al., 1979, p. 259)</p> <p>"The turret is difficult to enter from the crew compartment and if stopped at points in its traverse it is not possible to exit into the crew compartment." (Smith et al., 1980, p. 43)</p>

## HUMAN FACTORS ISSUES (CON'T)

### Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
2.10	<p><b>Adjusting your seat to be comfortable.</b></p> <p>"The size and location of the gunner's seat restricts the gunner from standing on the floor of the vehicle." (Mock &amp; Hill, 1978, p. 33)</p> <p>"The [gunner's] seat is not sufficiently adjustable for proper use by the track commander during vehicle movement as it does not lower enough to permit standing on it without exposing the track commander in the hatch, nor does it elevate enough to allow the track commander to sit on the seat and still see over the hatch." (Mock &amp; Hill, 1978, p. 66)</p> <p>"The SL's station did not provide adequate space and the seat was uncomfortable and poorly located." (Rushton et al., 1978, p. xv)</p> <p>"The driver's seat was considered to be uncomfortable especially for long distance driving. The seat back is seldom used because it gets in the way when exiting the vehicle. (The seat back column also slows down egress.) When driving with the seat at its highest point, the driver's back hits the edge of the hatch before it hits the backrest and thus he receives no back support from the seat back. Several drivers reported hitting their heads when driving with the hatch closed because the seat would not adjust low enough. There were also comments that the seat should move forward more so it would be easier for the driver to reach the controls." (Hammond &amp; Redden, 1984, p. 51)</p> <p>"The lack of a gunner's seat back was considered to be a problem when operating for long periods of time. However, most of those questioned thought that a seat back should not be added because it would slow down escape from the vehicle. The gunner (or squad leader's) open hatch visibility was greatly effected by the height of the seat. The seat does not adjust high enough so that the occupant can see out of the vehicle while seated. Therefore, many are standing or kneeling on the seat. There has been a recent incident (when the vehicle rolled) in which a soldier was killed while doing this." (Hammond &amp; Redden, 1984, p. 51)</p> <p>"A gunner's seat backrest is needed and a much better method for seat adjustment devised. The seat now often requires two men to adjust it." (Smith et al., 1980, p. 44)</p> <p>"The [commander's] seat was difficult to stay on, it had no back support and was unadjustable and uncomfortable." (Smith et al., 1980, p. 18)</p>
2.10	<p><b>Discomfort riding at high speeds.</b></p> <p>"A problem with the general discomfort experienced when in the vehicle for long periods of time." (Mock et al., 1979, p. 40)</p> <p>"Bounced around - poor ride quality - no support for the middle back on seat." (Rushton et al., 1978, p. 792)</p> <p>"The M113A1 is generally regarded as uncomfortable-the ITV is obviously no better. ITV problem areas were: vibration, low temperature, being bounced around, and general discomfort when in the vehicle for a long time or riding at high speed." (Smith et al., 1980, p. 14)</p>
2.06	<p><b>Machinegun cannot be operated while launching.</b></p> <p>"The machinegun could be fired only when the weapon hatch was fully open." (Robinson et al., 1978, p. 35)</p>



# HUMAN FACTORS ISSUES (CON'T)

## Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
2.06	<p><b>High temperature in vehicle.</b></p> <p>"Crew comfort is poor in hot weather because of lack of air conditioning. Wearing of TA50 gear restricts the crew movement." (Rushton et al., 1978, p. 791)</p> <p>"In warm weather the ventilation is not adequate, there is no air conditioning available,..." (Rushton et al., 1978, p. 817)</p> <p>"The crews had a problem with high temperature inside the vehicle." (Corbett et al., 1979, p. ix)</p> <p>"Many complained of extreme heat during summer months." (Hammond &amp; Redden, 1984, p. 53)</p>
2.00	<p><b>Getting into your seat.</b></p> <p>"The gunner's seat is hard to get in and out of, and it is in the way when the gunner stands in the hatch." (Smith et al., 1980, p. 55)</p> <p>"...there appear to be several problems for the track commander's seat: head, leg, hip or shoulder room, difficulty getting to the seat, and danger because of closeness of the turret." (Smith et al., 1980, p. 18)</p> <p>"The seating area for the loader and observer(s) is often littered with personal equipment and weapons not provided with permanent storage points." (Smith et al., 1980, p. 47)</p>
1.94	<p><b>Objects sticking out in vehicle that are safety hazards.</b></p> <p>"The SL's seat and turret proximity in vehicles equipped with the CVD presents a potential hazard if the Missile Guidance Set plug hits the SL or hooks onto his clothing or equipment." (Rushton et al., 1978, p. viii)</p> <p>"Several vehicle characteristics were problems to crew members. Noted particularly as inadequate were: power of the engine, speed, maneuverability, ability to climb hills and to get into and out of defilade positions." (Smith et al., 1980, p. 14)</p>
1.88	<p><b>Noise annoying to you.</b></p> <p>"The peak sound pressure levels recorded in the crew compartment exceed the safe limit for occupants without hearing protection (140 db, per MIL-STD-1474A (M1)). However, these levels are safe for personnel using hearing protection devices defined in TB-MED-251." (Robinson et al., 1978, p. 153)</p>
1.88	<p><b>Feeling disoriented when you are riding in the vehicle.</b></p> <p>"The crew members in the rear of the vehicle complained that they could not see outside the vehicle. They suggested the addition of vision blocks or firing ports. Rushton, et al., 1979, also found that crew vision problems were experienced in the closed hatch mode." (Hammond &amp; Redden, 1984, p. 52)</p>
1.81	<p><b>Escaping from the vehicle from your seat.</b></p> <p>"The gunner's seat is hard to get in and out of, and it is in the way when the gunner stands in the hatch." (Smith et al., 1980, p. 55)</p>
1.81	<p><b>General discomfort when in the vehicle for short time periods.</b></p> <p>"Bounced around - poor ride quality - no support for the middle back on seat." (Rushton et al., 1978, p. 792)</p> <p>"All vehicle seats were rated to be uncomfortable and to provide very little support." (Hammond &amp; Redden, 1984, p. 50)</p>

## HUMAN FACTORS ISSUES (CON'T)

### Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
1.75	<p><b>Closeness of the SL's position to turret.</b></p> <p>"The SL's seat is too close to the gunner's platform assembly, and it adds to the congestion which makes it difficult for the SL and gunner to move to and from their respective positions." (Mock &amp; Hill, 1978, p. 66)</p> <p>"The turret basket and the gunner's feet often strike the SL while he is at his position in the ITV..." (Mock &amp; Hill, 1978, p. 68)</p> <p>"The turret base, and the gunner's feet often strike the squad leader if he is at his station." (Rushton et al., 1978, p. 822)</p> <p>"Additionally, there were several safety hazards to the squad leader when he was seated at the viewer." (Fletcher et al., 1977, pp. 1-7)</p> <p>"The squad leader's seat and turret proximity presents a potential hazard to the crew members clothing and body." (Corbett et al., 1979, p. ix)</p> <p>"The Infantry squad leaders were very concerned about ...the danger brought about by the closeness of the squad leader's seat to the moving turret." (Mock et al., 1979, p. 40)</p> <p>"When the turret traverses, the MGS sometimes hits the squad leader's knee." (Hammond &amp; Redden, 1984, p. 50)</p>
1.75	<p><b>Adequacy of lighting at your duty position.</b></p> <p>"A light is needed over the missile storage rack to aid loaders during reload operations." (Rushton et al., 1978, p. 827)</p> <p>"Comments were received about the inadequacy of interior lighting in all crew positions." (Hammond &amp; Redden, 1984, p. 52)</p>
1.75	<p><b>Adequacy of lighting inside vehicle.</b></p> <p>"Workspace...and the lighting is extremely poor." (Rushton et al., 1978, p. 817)</p> <p>"A light is needed over the missile storage rack to aid loaders during reload operations." (Rushton et al., 1978, p. 827)</p> <p>"The vehicle was considered to be extremely dark when all hatches were closed. Also, placement of many of the available interior lights was considered to be incorrect." (Hammond &amp; Redden, 1984, p. 52)</p>
1.69	<p><b>Operating the backup hydraulic pump.</b></p> <p>"The provision of backup power to operate the ITV launcher was inadequate for launcher erection or turret traverse." (Mock &amp; Hill, 1978, p. 7)</p> <p>"The use of the manual backup power to track a target was extremely difficult while maintaining the accumulator pressure required for turret operations." (Mock &amp; Hill, 1978, p. 70)</p> <p>"The backup power is unsatisfactory." (Mock &amp; Hill, 1978, p. 72)</p> <p>"This system [manual backup] required the efforts of all of the crewmembers to pump up accumulator pressure and maintain that pressure during tracking. Further, the two live missiles that were fired using backup power resulted in target misses. These misses were attributed by the crews to a lack of accumulator pressure." (Rushton et al., 1978, p. viii)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
	<p>"Back-up operation and tracking in that mode was a serious problem identified by the player participants as requiring a change before vehicle production. The handle location was awkward and the entire crew was fatigued during the operation of the system." (Rushton et al., 1978, p. xv)</p> <p>"The following observations were made on the manual backup power system. The system required the efforts of all of the crew members to pump up the accumulator pressure and maintain that pressure during traverse and tracking. The heat and fatigue factor was greatly increased because of operating in a humid climate and when the crew was dressed in NBC gear." (Corbett et al., 1979, p. v)</p> <p>"The present backup power system is effective for short duration but is inadequate for any prolonged periods of target detection and engagement functions. However, no main power difficulties were experienced in testing which would have required use of the backup power system." (Corbett et al., 1979, p. xii)</p> <p>"Crewmembers in both the infantry and cavalry noted the hydraulic lines, as well all other turret equipment, interfered with operating the hydraulic pump for backup power." (Corbett et al., 1979, p. 245)</p> <p>"Both the Cavalry and Infantry gunners felt that there was great difficulty in operating the hand hydraulic pump. In fact, the Cavalry gunners considered it more serious than did the Infantry gunners." (Mock et al., 1979, p. 18)</p> <p>"...pumping the hydraulic hand pump required excessive physical effort and strength." (Hammond &amp; Redden, 1984, p. 52)</p>
1.69	<p><b>Discomfort riding at slow speeds.</b></p> <p>"All vehicle seats were rated to be uncomfortable and to provide very little support." (Hammond &amp; Redden, 1984, p. 50)</p> <p>"Discomfort and motion sickness dependent on terrain and lack of external vision." (Rushton et al., 1978, p. 792)</p>
1.69	<p><b>Headset/helmet comfort.</b></p> <p>"The "pop-up" capability of the driver's hatch does not provide significant advantage over the M113 driver's hatch. Wearing a combat vehicle crash (CVC) helmet causes a driver to press his head against the inside of a popped hatch to see outside to drive." (Mock &amp; Hill, 1978, p. 66)</p>
1.68	<p><b>Getting out of the vehicle from your seat.</b></p> <p>"The gunner's seat is hard to get in and out of, and it is in the way when the gunner stands in the hatch." (Smith et al., 1980, p. 55)</p> <p>"The SL's seat is too close to the gunner's platform assembly, and it adds to the congestion which makes it difficult for the SL and gunner to move to and from their respective positions." (Mock &amp; Hill, 1978, p. 66)</p>
1.66	<p><b>Malfunction of radio/intercom system.</b></p> <p>"The intercom failures were certainly temperature induced, since pre- and post-test checks at ambient temperature were successful. ... The intercom system failure is considered a shortcoming because of the loss of communication would hamper a combat mission." (Robinson et al., 1978, p. 75)</p> <p>"The ITV communications appear to be satisfactory." (Mock et al., 1979, p. iv)</p>

## HUMAN FACTORS ISSUES (CON'T)

### Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
	"The outside observer's telephone communication link with the ITV was completely interrupted by the keying of a combat vehicle crash helmet inside the vehicle during Operational Test III. This difficulty was not experienced during the FOE and the effectiveness of the outside observer's communications ability with the ITV was influenced by the experience level of the respective crew." (Mock, Hill & Miller, 1979, p. 22)
1.66	<b>Changing hatch positions easily and safely.</b> <p>"The gunner's hatch release lock is too hard for gunner to release and should be relocated. Driver's hatch release location makes it a hazard to the driver if it is not released cautiously." (Rushton et al., 1978, p. 817)</p> <p>"The loader's cargo hatch is extremely difficult to close and often required more than one crewmember to complete the task." (Rushton et al., 1978, p. 820)</p> <p>"The complaints about the driver's hatch are justified. The hatch requires the drivers to be careful when moving from one position to another to avoid injury." (Robinson et al., 1978, p. 61)</p> <p>"The two step operation of the driver's hatch cover was considered to be difficult to operate, especially when the crew practices to escape from the ITV." (Hammond &amp; Redden, 1984, p. 51)</p>
1.63	<b>Noise causes trouble hearing communications.</b> <p>"In response to a survey question about whether or not their platoons had high commo failure rates in a field environment, 59% said Yes or Sometimes. The intercom system was listed by the crew as the communications component failing most often." ((Hammond, 1985, p. 25)</p> <p>"Communication between the loader and gunner is difficult with all the noises that are going on and it would be even more difficult in combat." (Rushton et al., 1978, p. 824)</p> <p>"The nose level of the engine greatly interfered with communication between crew members unless the CVC helmet was worn." (Hammond &amp; Redden, 1984, p. 53)</p>
1.63	<b>Trying to dismount after being in vehicle for some period of time.</b> <p>"Crowding and cramped space are always problems in multimanned vehicles, and the ITV was no exception. Additional problems in the ITV were the ability to get over or by other crew members seats and difficulty operating wearing extra gear (e.g., CBR protection)." (Smith et al., 1980, p. 14)</p> <p>"The crew members in the rear of the vehicle complained that they could not see outside the vehicle. They suggested the addition of vision blocks or firing ports. Rushton, et al., 1979, also found that crew vision problems were experienced in the closed hatch mode." (Hammond &amp; Redden, 1984, p. 52)</p>
1.63	<b>Exposed hydraulic fluid lines used as hand holds.</b> <p>"The exposed turret hydraulic lines presented convenient handholds for the crew, particularly the gunner while entering/exiting the gunner's station. Damaged hydraulic lines from use as a handhold or from impact with shifting equipment could result in disrupted turret operations." (Mock &amp; Hill, 1978, p. 70)</p> <p>"A cover or shield is needed to protect the exposed hydraulic lines on the cupola." (Rushton et al., 1978, p. 817)</p> <p>"The hydraulic lines often became hand holds." (Rushton et al., 1978, p. 821)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
1.59	<p>Things getting jammed underneath turret on floor of vehicle.</p> <p>"...and the arrangement of the turret base permits loose items on the floor becoming wedged under the basket." (Mock &amp; Hill, 1978, p. 68)</p> <p>"A protective cover at the bottom of the cupola base is needed to prevent items from entering under it." (Rushton et al., 1978, p. 817)</p> <p>"Loose items on the floor get wedged under the [blank space] crew member recalls being pinned to a wall by a rotating turret." (Rushton et al., 1978, p. 822)</p>
1.56	<p>Ability to get individual weapon when required.</p> <p>"M16 storage racks are available for the driver and the track commander in the driver's compartment. These were insufficient and inaccessible in most situations. Other equipment was stored or dumped on the racks. There were no permanent racks available for the other M16s." (Mock &amp; Hill, 1978, p. 67)</p> <p>"Cramped space was perceived as a serious problem because of the difficulty in reaching for personal weapons and the lack of space available for stowage of personal gear." (Rushton et al., 1978, p. xiv)</p> <p>"Can't reach personal weapon." (Rushton et al., 1978, p. 792)</p> <p>"Inability to get at their personal weapons where stored was also seen as a problem." (Smith et al., 1980, p. 14)</p> <p>"All squad leaders said there were serious problems due to too little space in the squad leader's station and because of difficulty reaching their personal weapons were stored." (Smith et al., 1980, p. 18)</p>
1.56	<p>Adequacy and accessibility of safety/emergency equipment.</p> <p>Minor problem (Smith et al., 1980, p. 16).</p>
1.50	<p>Headset/helmet difficulties during dismount.</p> <p>"During dismount drills, the crews sometimes forgot to disconnect the intercom cord, which occasionally resulted in damage to the cord." (Robinson et al., 1978, p. 50) DTV</p>
1.50	<p>Amount of padding on periscope.</p> <p>"The CVD cannot be used by most squad leaders for navigation. They stated that they were forced to do so for awhile but balked at this situation after one road march. Bruised cheekbones and poor visibility due to vibration of the CVD were the general results." (Smith et al., 1980, p. 43)</p>
1.50	<p>Ability to operate ITV wearing MOPP gear.</p> <p>"It is noted that the mean time to complete the process of acquisition and simulated two round engagement is greater by a factor of approximately 2 for the sequence when NBC equipment was employed and a factor of approximately 3 when the backup power mode was employed than when primary power with no NBC equipment was used." (Rushton et al., 1978, p. v)</p> <p>"Operation with CBR gear was a serious problem because of the already cramped space." (Rushton et al., 1978, p. xv)</p> <p>"The crews expressed concern about their inability to operate the ITV while wearing NBC gear." (Corbett et al., 1979, p. ix)</p>

## HUMAN FACTORS ISSUES (CON'T)

### Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
	"A concern about their inability to operate the ITV while wearing NBC protective clothing." (Mock et al., 1979, p. 40)
	"Recognizing the crowdedness of vehicles like the ITV, in this report little attention has been given to crew member's repeated complaints in these areas. It is a fact, however, that they gave poor ratings to conditions such as space to operate while wearing winter clothing - but even when wearing normal personal gear. The personal storage situation (clothing, etc.) is also rated as serious and probably should receive attention." (Smith et al., 1980, p. 41)
1.48	<b>Fumes from vehicle heater.</b>  "Also, during operation of the functional heaters, fumes are noticeable in the crew compartment. The potential for these conditions becoming a hazard was not addressed in OT III." (Mock & Hill, 1978, p. 68)  "In winter operations fumes from functional heaters are noticeable." (Rushton et al., 1978, p. 828)
1.47	<b>Ramp operations or obstructions.</b>  "The driver for the Infantry TOW squad reported that the ammunition cases stowed behind his seat interfered with entering and exiting the vehicle through the rear ramp." (Fletcher et al., 1977, pp. 2-38)
1.44	<b>Fumes from other sources inside the vehicle.</b>  "Ventilation in the vehicle was rated to be mediocre (4.1). Many complained of extreme heat during summer months. The accumulation of fumes inside the vehicle was considered a safety problem." (Hammond & Redden, 1984, p. 53)
1.44	<b>Loose items/equipment on the floor.</b>  "Vehicle vibration was rated to be extreme (3.72). It often caused stowed equipment to vibrate loose and to fall to the floor." (Hammond & Redden, 1984, p. 53)  "Lack of detailed, proven, loading plans resulted in loose equipment cluttering the floor and all available places...These loose items often presented hazards to ITV operations." (Rushton et al., 1978, p. 819)  "After each trip, it was noted the metal can stowed under the troop seat at the left rear of the vehicle had slid out into the middle of the floor. Test supervisory personnel noted that the cans were in the work area used by the assistant gunner to prepare the missiles and to load the system. Also, some of the equipment stowed on the left sponson slid off the sponson and onto the floor around the turret." (Fletcher et al., 1977, pp. 2-11)  "Equipment is subject to damage because of inadequate storage and because of loose items on the floor." (Smith et al., 1980, p. 14)
1.44	<b>Exposed electrical cables used as hand holds.</b>  "The biggest repair problem so far has been disconnecting and reconnecting electrical cables. There are so many of these cables, and they just hang loose. They are not covered the way they should be. The crews keep ripping them out accidentally. They get tangled up in the turret and get ripped out when the turret is traversed." (Corbett et al., 1979, p. 297)

**HUMAN FACTORS ISSUES (CON'T)**  
Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
1.41	<p><b>Damage to personal gear due to inadequate storage.</b></p> <p>"There is a need for better stowage (e.g., system of straps, stow more things outside, possibly putting duffel bags outside in metal containers for protection)." (Smith et al., 1980, p. 57)</p>
1.38	<p><b>Length of headset cord.</b></p> <p>"...crew members were bothered by headset cords getting in the way." (Smith et al., 1980, p.14)</p>
1.31	<p><b>Sharp points on camrail around gunner's cupola.</b></p> <p>"Clothing and gear snagging during vehicle ingress/egress was a problem because of sharp edges and exposed hydraulic lines." (Rushton et al., 1978, p. xv)</p>
1.31	<p><b>Loading plan of vehicle.</b></p> <p>"The right rear vision block is seldom accessible to the crew because of tripod storage." (Mock &amp; Hill, 1978, p. 67)</p> <p>"Personal equipment stowed outside the vehicle in duffel bags was severely damaged or lost during the field test exercise. Duffel bags inside were difficult to store as adequate space was not available. Two people were being asked to share one bag to conserve storage space and were unable to carry what could be considered basic personal equipment when limited to half of a duffel bag." (Mock &amp; Hill, 1978, p. 67)</p> <p>"Storage space on the ITV is not adequate for all required equipment and this condition has resulted in the crew storing some equipment on top of the vehicle battery box. This practice can cause the battery box cover to buckle, which in turn will allow a shorting across the batteries and could result in an electrical fire within the crew compartment." (Mock &amp; Hill, 1978, p. 68-69)</p> <p>"Individual weapons stowage or lack of proper stowage could present a safety problem." (Rushton et al., 1978, p. xiv)</p> <p>"All players felt that the equipment stowage plan required substantial modification prior to production." (Rushton et al., 1978, p. xv)</p> <p>"Lack of detailed, proven, loading plans resulted in loose equipment cluttering the floor and all available places...These loose items often presented hazards to ITV operations." (Rushton et al., 1978, p. 819)</p> <p>"The ITV as presently configured is not capable of carrying all of the equipment prescribed for either the Infantry TOW squad or the Armored Cavalry crew." (Fletcher et al., 1977, pp. 1-7)</p> <p>"Additional provisions for stowage should be developed for the ITV." (Fletcher et al., 1977, pp. 1-8)</p> <p>"Five of the eight test soldiers reported that the small arms ammunition cases shifted position during vehicle movement and four of these test soldiers considered the problem to be of sufficient magnitude to constitute a potential safety hazard." (Fletcher et al., 1977, pp. 2-38)</p> <p>"Crew members expressed concern over the vehicle loading plans..." (Corbett et al., 1979, p. x)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
1.31	<p>Noise causing hearing problems that last after noise has stopped.</p> <p>"The peak sound pressure levels recorded in the crew compartment exceed the safe limit for occupants without hearing protection (140 db, per MIL-STD-1474A (M1)). However, these levels are safe for personnel using hearing protection devices defined in TB-MED-251." (Robinson et al., 1978, p. 153)</p>
1.28	<p>Headset cord in way while doing my job.</p> <p>"Head set cords were in the way during reloading due to intercom box locations." (Rushton et al., 1978, p. xv)</p> <p>"The loader's intercom box is placed inappropriately. In its present location the loader's connecting cord gets tangled with the missiles during loading and with other crewmen in the crew compartment." (Rushton et al., 1978, p. 819)</p> <p>"The loaders stated their headset cords were in the way while loading missiles." (Corbett et al., 1979, p. 259)</p>
1.25	<p>Feeling motion sick when buttoned up.</p> <p>"Discomfort and motion sickness dependent on terrain and lack of external vision." (Rushton et al., 1978, p. 792)</p>
1.25	<p>Unsafe conditions for missile firing due to failure of hatch interlock system.</p> <p>"Microswitches and proximity switches presented a reliability problem during the ITVFOE. ... Crews appeared to be able to overcome the purpose of proximity switches and were observed performing target acquisition trials with hatches open. This was accomplished even when the override switches were wired in position." (Corbett et al., 1979, p. 62)</p> <p>"The hatch interlock system had several failures in which the system indicated that a hatch was closed, whether or not it was. This could allow a missile to be fired with a hatch open or allow the turret to be operated with an interfering hatch open. The former could endanger the crew and the latter equipment." (Robinson et al., 1978, p. 145)</p>
1.25	<p>Feeling motion sick when riding long periods at high speeds.</p> <p>"Discomfort and motion sickness dependent on terrain and lack of external vision." (Rushton et al., 1978, p. 792)</p>
1.22	<p>Hearing/communications with the SL/others while inside vehicle.</p> <p>"The squad leader must control the crew activities and he may coordinate those of a second ITV crew as well. His duty station is not designed to facilitate his command functions." (Smith et al., 1980, p. 42)</p> <p>"The noise level of the engine greatly interfered with communication between crew members unless the CVC helmet was worn." (Hammond &amp; Redden, 1984, p. 53)</p>
1.22	<p>Damage to weapons and equipment due to inadequate storage.</p> <p>"Personal equipment stowed outside the vehicle in duffel bags was severely damaged or lost during the field test exercise. Duffel bags inside were difficult to store as adequate space was not available. Two people were being asked to share one bag to conserve storage space and were unable to carry what could be considered basic personal equipment when limited to half of a duffel bag." (Mock &amp; Mill, 1978, p. 67)</p>



# HUMAN FACTORS ISSUES (CON'T)

## Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
	"Lack of detailed, proven, loading plans resulted in loose equipment cluttering the floor and all available places. Night vision goggles in unsecured locations sustained damage...These loose items often presented hazards to ITV operations." (Rushton et al., 1978, p. 819)
1.19	<p><b>Not enough air when the vehicle is buttoned up.</b></p> <p>"There is a lack of ventilation when the hatches are buttoned up since vents must be closed for firing the TOW." (Mock &amp; Hill, 1978, p. 68)</p> <p>"There are no provisions for circulating the air in the crew compartment which is particularly evident during live fire operations when the crew is buttoned up." (Mock &amp; Hill, 1978, p. 70)</p> <p>"When sealed, the ITV becomes stuffy in a short period of time." (Rushton et al., 1978, p. 827)</p> <p>"Ventilation was a problem when the vehicle was operating in a buttoned-up condition." (Corbett et al., 1979, p. ix)</p> <p>"A problem with not enough air in the vehicle when it was buttoned up, and the amount of ventilation in the vehicle." (Mock et al., 1979, p. 40)</p> <p>"Ventilation in the vehicle was rated to be mediocre..." (Hammond &amp; Redden, 1984, p. 53)</p>
1.19	<p><b>Preparing to move away from the firing area after missile impact.</b></p> <p>"The inability to move the vehicle rapidly with the launcher erect, the frequent required boresighting, and the delays getting ready to fire or depart after firing were all seen as needing major improvements." (Smith et al., 1980, p. 53)</p>
1.16	<p><b>Lack of covers for sights.</b></p> <p>"The optics had no easily used covers and were difficult to keep usably clean." (Smith et al., 1980, p. 23)</p> <p>"Sights were considered too exposed to hostile fire damage." (Smith et al., 1980, p. 45)</p>
1.13	<p><b>Activating controls accidentally.</b></p> <p>"Switches on the gunner's station are subject to activation by the gunner's personal clothing/equipment during gunner entry, or when the gunner stands on the seat." (Mock &amp; Hill, 1978, p. 67)</p> <p>"Gunnery control switches are subject to being activated when the gunner is standing in his seat during open hatch operations." (Rushton et al., 1978, p. xiv)</p> <p>"Need push buttons instead of toggle switches to prevent accidental activation by gunner standing in his seat." (Rushton et al., 1978, p. xv)</p> <p>"NBC clothing and LBE often snag on items inside the vehicle which slows down ingress and egress and at times accidentally activate controls." (Hammond &amp; Redden, 1984, p. 50)</p> <p>"...switches are subject to activation during gunner entry, or when the gunner stands on the seat [due to bumping]." (Smith et al., 1980, p. 43)</p>

## HUMAN FACTORS ISSUES (CON'T)

### Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
1.13	<p><b>Ability to operate ITV wearing cold weather gear.</b></p> <p>Crowding and cramped space are always problems in multimanned vehicles, and the ITV was no exception. Additional problems in the ITV were the ability to get over or by other crew members seats and difficulty operating wearing extra gear (e.g., CBR protection)." (Smith et al., 1980, p. 14)</p>
1.08	<p><b>Broken headsets.</b></p> <p>"In response to a survey question about whether or not their platoons had high commo failure rates in a field environment, 59% said Yes or Sometimes. The intercom system was listed by the crew as the communications component failing most often." (Hammond, 1985, p. 25)</p>
1.07	<p><b>Adequacy of maintenance manuals.</b></p> <p>"During OTIII, the TMs at all levels contained an excessive quantity of technical errors. Unless the TMs are technically verified and completely performance validated, the system may not be maintainable on deployment." (Rushton et al., 1978, p. viii)</p> <p>"Maintenance manuals were deficient in that they did not contain detailed instructions for troubleshooting or accomplishing many of the repairs which were required during the ITV FOE." (Corbett et al., 1979, p. xi)</p> <p>"The initial issue draft technical manuals (DTMs), dated July 1977, received with the test hardware and maintenance test package were considered to be completely inadequate. Use of these DTMs during the physical teardown and review required that they be almost completely rewritten, and updated DTMs were issued, dated October 1977. During the test period, additional changes were received which further improved the revised manuals." (Robinson et al., 1978, p. 104)</p> <p>"The maintenance manuals were generally adequate except for deficiencies in proceduralized troubleshooting and some repair action instructions. The manuals were incomplete in some cases or had omitted complete repair procedures. The parts manuals were incomplete and some pages were marked for later publications." (Mock et al., 1979, p. 38)</p> <p>"A detailed desk review and verification against the equipment revealed that the set of draft technical manuals was inadequate for use by the Army." (Robinson, 1978, p. 6)</p> <p>"The quality of the equipment publications received to support the ITV kit was classified as a shortcoming due to the inadequacy of maintenance instruction and illustrations, and incomplete diagrams." (Dailey, Powell, &amp; Hulcy, 1979, p. 5)</p>
1.03	<p><b>Getting foot caught underneath the rotating turret.</b></p> <p>"The rotating bottom plate of the turret was seen as dangerous to feet..." (Smith et al., 1980, p. 14)</p>
1.00	<p><b>Latches working loose on hatch covers.</b></p> <p>"The latches that hold the gunner's hatch cover and the driver's hatch cover open require a better lock to preclude the hatches falling during movement and the potential for resulting injury to the driver or gunner." (Mock &amp; Hill, 1978, p. 68)</p> <p>"Latches for the gunner and driver hatches can allow the hatches to work loose." (Rushton et al., 1978, p. xiv)</p> <p>"Latches which hold the gunner's hatch cover and the driver's hatch cover open need a better lock so the hatches will not fall during moving operations with possible dire consequences." (Rushton et al., 1978, p. 792)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
	<p>"The locks on all the vehicle hatches were reported to come unfastened when driving across rough terrain." (Hammond &amp; Redden, 1984, p. 51)</p> <p>"The driver's hatch has been critized by all drivers. Its "pop-up" capability does not provide significant advantage over the old M113A1 driver's hatch. Wearing a combat vehicle crash helmet (CVC) causes a driver to press his head against the inside of a popped hatch to see outside to drive. This feature would be more useful if an inch or two were added to the height the hatch raises. The hatch pop-up latch has caused some problems as well. The hatch, in the pop-up mode has been shown to unlatch and hit the driver during travel." (Smith et al., 1980, pp. 46-47)</p>
0.97	<p><b>Coordinating with SL while inside.</b></p> <p>"The underlying reason for this lack of CVD effect (despite its apparently good performance with the Mech crews) is attributable to the lack of an effective method for transmitting the target information (azimuth, range, and target reference) from the commander to the gunner." (Mock &amp; Hill, 1978, p. 14)</p> <p>"...adequate except for the following deficiencies: CVC helmet communication interference with external wire/telephone communications. Restricted communications connection for the gunner." (Mock &amp; Hill, 1978, p. 34)</p>
0.91	<p><b>Sufficient number of hand holds.</b></p> <p>"Safety crash padding and adequate hand holds were not provided to the extent desired by many of the participants." (Rushton et al., 1978, p. xiv)</p>
0.85	<p><b>Force needed to lock/unlock the night sight to/from day sight.</b></p> <p>"The force required to lock and unlock the nightsight to/from the daysight is excessive." (Dailey, Powell, &amp; Hulcy, 1979, p. 3)</p>
0.63	<p><b>Fumes from missiles during live fire.</b></p> <p>"It was observed that to prevent fumes from entering the crew compartment the TOW missile could not be fired at an elevation greater than 24 deg. over the back deck of the IIV without first placing a metal shield over the engine compartment and driver's hatch." (Rushton et al., 1978, p. iv)</p> <p>"The large amount of smoke which enters the vehicle could cause temporary choking and tearing of the crew due to irritation, but no long-term effects. Opening of hatches for a minute or two should probably be required because of the lack of forced air ventilation." (Robinson et al., 1978, p. 153)</p> <p>"The results of firings 3 and 4 were similar to those of the previous test at 37 degrees elevation in that large amounts of smoke were forced into the crew compartment through the engine access panels. The access panel seals were blown outward during these tests, but panel buckling as was encountered after the 37 degrees elevation firing was not noticeable." (Robinson, 1978, p. 7)</p> <p>"The crew can be temporarily incapacitated by gases resulting from firing missiles at high elevations over the rear of the vehicle (a previous shortcoming)." (Dailey, Powell, &amp; Hulcy, 1979, p. 2)</p>
0.58	<p><b>Overpressure during missile firing.</b></p> <p>"The results of firings 3 and 4 were similar to those of the previous test at 37 degrees elevation in that large amounts of smoke were forced into the crew compartment through the engine access panels. The access panel seals were blown outward during these tests, but panel buckling as was encountered after the 37 degrees elevation firing was not noticeable." (Robinson, 1978, p. 7)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Common Crew - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
0.50	<p>Adequacy of missile storage straps in keeping missiles from moving, being damaged, or falling from racks.</p> <p>"The missile straps did not hold the missiles secure, thereby allowing the TOW missiles to bounce back and shift around. Missiles could damage equipment to endanger the crew's safety." (Robinson et al., 1978, p. 145)</p>

## HUMAN FACTORS ISSUES

### Squad Leader - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
3.00	<p>Seeing through the squad leader's periscope (SLP) at night.</p> <p>"Ability of the SL to do his job from his station was limited by the following factors: inability to navigate from the SL seat, inability to see at night or during bad weather from SL seat, difficulty seeing through the Commanders Viewing Device (CVD) during movement or night operations, and obstructions to vision while using CVD." (Rushton et al., 1978, p. xv)</p> <p>"The infantry squad leaders found considerable fault with the device. The station affords no view of the battlefield except through the CVD. Seeing well in the daytime is difficult, at night worse (because of no night vision device capability) and on the move nearly impossible." (Smith et al., 1980, p. 18)</p>
3.00	<p>Seeing through the SLP while in full defilade.</p> <p>"In a defilade position the vehicle may be positioned where the CVD is below the crest of the concealed location. If above this point, an inclined parking position may give the squad leader a view of the sky." (Rushton et al., 1978, p. 823)</p>
3.00	<p>Seeing through the SLP when the driver's hatch is open.</p> <p>"Ability of the SL to do his job from his station was limited by the following factors: inability to navigate from the SL seat, inability to see at night or during bad weather from SL seat, difficulty seeing through the Commanders Viewing Device (CVD) during movement or night operations, and obstructions to vision while using CVD." (Rushton et al., 1978, p. xv)</p> <p>"When the driver hatch was in the full up position, it obscured the CVD field to the vehicle front." (Robinson et al., 1978, p. 35)</p> <p>"The ability to see with the squad leader's periscope when the driver's hatch was open was a problem." (Mock et al., 1979, p. 41)</p> <p>"The squad leader's periscope (SLP) was overwhelmingly considered to be inadequate. It does not provide 360 degrees of vision because it is blocked by the turret and sometimes by the open driver's hatch." (Hammond &amp; Redden, 1984, p. 52)</p>
2.75	<p>Seeing through the SLP in bad weather or when dust, smoke or haze are present.</p> <p>"Ability of the SL to do his job from his station was limited by the following factors: inability to navigate from the SL seat, inability to see at night or during bad weather from SL seat, difficulty seeing through the Commanders Viewing Device (CVD) during movement or night operations, and obstructions to vision while using CVD." (Rushton et al., 1978, p. xv)</p> <p>"The Infantry squad leaders inability to see in bad weather was perceived as a problem." (Corbett et al., 1979, p. x)</p> <p>"The Infantry squad leaders were very concerned about their inability to see in bad weather from the squad leader's seat..." (Mock et al., 1979, p. 40)</p>
2.75	<p>Keeping track of your full area of battlefield responsibility using the SLP.</p> <p>"Ability of the SL to do his job from his station was limited by the following factors: inability to navigate from the SL seat, inability to see at night or during bad weather from SL seat, difficulty seeing through the Commanders Viewing Device (CVD) during movement or night operations, and obstructions to vision while using CVD." (Rushton et al., 1978, p. xv)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Squad Leader - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
	"The Commander's viewing device (CVD) is too limited in field of view and occluded by too many things on top of the vehicle. It is also too limited in height. The squad leader will not be able to see the battlefield from defilade." (Smith et al., 1980, p. 54)
2.75	<p><b>Navigating and controlling from the squad leader's (SL) seat.</b></p> <p>"Control of the ITV during Operational Test III resided with the crewmember occupying the gunner's seat during stationary and moving trials." (Mock &amp; Hill, 1978, p. 27)</p> <p>"The CVD was not usable for control during ITV movement." (Mock &amp; Hill, 1978, p. 27)</p> <p>"Both the infantry and cavalry squad leaders (vehicle commanders) considered that control of the vehicle from the vehicle commander's position while moving was a serious problem." (Mock &amp; Hill, 1978, p. 29)</p> <p>"Ability of the SL to do his job from his station was limited by the following factors: inability to navigate from the SL seat, inability to see at night or during bad weather from SL seat, difficulty seeing through the Commanders Viewing Device (CVD) during movement or night operations, and obstructions to vision while using CVD." (Rushton et al., 1978, p. xv)</p> <p>"The crews were concerned about their ability to navigate from the squad leaders's seat." (Corbett et al., 1979, p. x)</p> <p>"Concern about their ability to navigate while in the squad leader's seat." (Mock et al., 1979, p. 41)</p> <p>"Squad leaders indicated that there were problems seeing well enough to do their jobs. For the infantry it was difficult to carry out command and control functions (with crew or other vehicles), and to navigate (either with the CVD or from the loader's hatch." (Smith et al., 1980, p. 18)</p> <p>"He [the squad leader] is forced to use the gunner's station while travelling to follow terrain and direct his vehicle. Should contact be made, or anticipated, he must get down and let the gunner move into the turret. The squad leader is now "blind" until the vehicle stops." (Smith et al., 1980, p.43)</p>
2.75	<p><b>Navigating and controlling from the loader's hatch.</b></p> <p>"Air guard and observation from the cargo hatch are almost impossible, even with the high stow launcher position. Observers are unable to stand upright and attempts to observe or navigate from the cargo hatch while traveling have not been practical." (Mock &amp; Hill, 1978, p. 67)</p>
2.75	<p><b>Being able to see well enough to do your job.</b></p> <p>"Visibility forward is nil and control of the vehicle must be delegated to the driver and gunner." (Rushton et al., 1978, p. 29)</p> <p>"Ability of the SL to do his job from his station was limited by the following factors: inability to navigate from the SL seat, inability to see at night or during bad weather from SL seat, difficulty seeing through the Commanders Viewing Device (CVD) during movement or night operations, and obstructions to vision while using CVD." (Rushton, Howard, Corbett, Engel &amp; McCool, 1978, p. xv)</p>
2.25	<p><b>Seeing through the SLP while the vehicle is moving.</b></p> <p>"The CVD could not be used to control the vehicle while moving. The vehicle commanders bruised their cheekbones when they attempted this." (Mock &amp; Hill, 1978, p. 29)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Squad Leader - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
	<p>"Ability of the SL to do his job from his station was limited by the following factors: inability to navigate from the SL seat, inability to see at night or during bad weather from SL seat, difficulty seeing through the Commanders Viewing Device (CVD) during movement or night operations, and obstructions to vision while using CVD." (Rushton et al., 1978, p. xv)</p> <p>"Loss of vision is experienced during closed hatch movement due to bumping motion of ITV." (Rushton et al., 1978, p. 791)</p> <p>"Squad leaders had difficulty keeping their eyes next to the eye piece during movement. Most sat, kneeled or stood in the gunner's seat during vehicle movement and surveillance because of problems with the SLP." (Hammond &amp; Redden, 1984, p. 52)</p>
2.25	<p><b>Seeing through the SLP when looking in the direction of launcher.</b></p> <p>"With the hatch open soldiers had clear vision to the front, but the launcher obstructed vision to the sides and rear." (Smith et al., 1980, p. 23)</p>
2.25	<p><b>Staying seated on the SL's seat while vehicle is moving.</b></p> <p>"The comfort and ability to stay for extended periods on the squad leader's seat were also considered to be a problem." (Mock et al., 1979, p. 41)</p> <p>"The seat was difficult to stay on, it had no back support and was unadjustable and uncomfortable." (Smith et al., 1980, p. 18)</p>
2.25	<p><b>Moving from SL's station to the turret during travel.</b></p> <p>"He [the squad leader] is forced to use the gunner's station while travelling to follow terrain and direct his vehicle. Should contact be made, or anticipated, he must get down and let the gunner move into the turret. The squad leader is now "blind" until the vehicle stops." (Smith et al., 1980, p.43)</p>
2.00	<p><b>Seeing through the SLP when glare/brightness is present.</b></p> <p>"Seeing well in the daytime is difficult, at night worse (because of no night vision device capability) and on the move nearly impossible. Complaints ... include: difficulty seeing because of obstructions, glare, dust, rain, etc., too little magnification, and narrow field of view, and difficulty estimating range, identifying and prioritizing targets, and covering the area of responsibility." (Smith et al., 1980, p. 18)</p>
2.00	<p><b>Estimating range to a target using the SLP.</b></p> <p>"Range estimation with all sights is considered difficult." (Rushton et al., 1978, p. 828)</p> <p>"It's hard to determine range when using the squad leaders' periscope. I'd like a little more training in that area." (Corbett et al., 1979, p. 216)</p>
2.00	<p><b>Bumping into the missile guidance set J-1 connector when sitting in the SL's seat.</b></p> <p>"The current location of the TOW Missile Guidance System (MGS) under the gunner's seat has contributed to it being easily damaged, makes it difficult to read, and it interferes with the location of the SL's seat." (Mock &amp; Hill, 1978, p. 66)</p> <p>"The SL's seat and turret proximity in vehicles equipped with the CVD presents a potential hazard if the Missile Guidance Set plug hits the SL or hooks onto his clothing or equipment." (Rushton et al., 1978, p. viii)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Squad Leader - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
1.50	<p>Keeping rain, snow, fog, dirt, mud, debris, etc. off SLP lenses.</p> <p>"Seeing well in the daytime is difficult, at night worse (because of no night vision device capability) and on the move nearly impossible. Complaints ... include: difficulty seeing because of obstructions, glare, dust, rain, etc., too little magnification, and narrow field of view, and difficulty estimating range, identifying and prioritizing targets, and covering the area of responsibility." (Smith et al., 1980, p. 18)</p> <p>"Adverse weather conditions caused by rain and snow, resulted in reduced visibility, poor trafficability and 13 "no test" days during the acquisition subtest." (Rushton et al., 1978, p. v)</p>
1.50	<p>Comfort while using the SLP.</p> <p>"The CVD cannot be used by most squad leaders for navigation. They stated that they were forced to do so for awhile but balked at this situation after one road march. Bruised cheekbones and poor visibility due to vibration of the CVD were the general results." (Smith et al., 1980, p. 43)</p>
1.25	<p>External radio antenna interfering with turret motion.</p> <p>"The radio antenna on the ITV must be tied down while launching TOW missiles, which reduces the range capability of the ITV radio. In view of the requirement for 360-degree traversing capability of the turret, the crews will have to be aware of this limitation and through unit SOPs will have to develop procedures for use of the antenna." (Mock &amp; Hill, 1978, p. 35)</p>
1.00	<p>Controlling the driver's activities while dismounted.</p> <p>"During acquisition trials with the squad leader dismounted and speaking to the ITV with a TA-312 telephone a communication problem developed. Any time a CVD was keyed it overrode the TA-312 and the squad leader lost control of his ITV/ITV section." (Rushton et al., 1978, p. 818)</p> <p>"Communications for the Infantry squad were inadequate for conducting operations with a dismounted squad leader." (Fletcher et al., 1977, pp. 1-8)</p>
1.00	<p>Controlling the gunner's activities while dismounted.</p> <p>"During acquisition trials with the squad leader dismounted and speaking to the ITV with a TA-312 telephone a communication problem developed. Any time a CVD was key it overrode the TA-312 and the squad leader lost control of his ITV/ITV section." (Rushton et al., 1978, p. 818)</p> <p>"Communications for the Infantry squad were inadequate for conducting operations with a dismounted squad leader." (Fletcher et al., 1977, pp. 1-8)</p>
0.86	<p>Controlling the driver's activities while in vehicle.</p> <p>"Control of fire and movement of the ITV is limited to the person occupying the gunner's seat." (Mock &amp; Hill, 1978, p.72)</p> <p>"The noise level of the engine greatly interfered with communication between crew members unless the CVC helmet was worn." (Hammond &amp; Redden, 1984, p. 53)</p>
0.86	<p>Directing gunner to a target you have located.</p> <p>"The underlying reason for this lack of CVD effect (despite its apparently good performance with the Mech crews) is attributable to the lack of an effective method for transmitting the target information (azimuth, range, and target reference) from the commander to the gunner." (Mock &amp; Hill, 1978, p. 14)</p>



# HUMAN FACTORS ISSUES (CON'T)

## Squad Leader - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
	"Squad leader would be the gunner on the move, plus the squad leader can't look for targets unless he was in the gunner's seat." (Rushton et al., 1978, p. 792)
0.75	<p><b>Communications with other vehicles to coordinate targets while in the vehicle.</b></p> <p>Minor problem (Smith et al., 1980, p. 20).</p>
0.75	<p><b>Attaching external radio antenna.</b></p> <p>This issue was included based on observations made during this research.</p>
0.75	<p><b>Knowing how to operate each crewman's position/equipment.</b></p> <p>"The SL should be trained in all crew tasks." (Mock &amp; Hill, 1978, pp. 60-61)</p> <p>"The crewmembers considered it would be beneficial to the crew as a whole if their SL understood the various tasks of the crewmembers in performing his task of commanding and controlling the ITV." (Mock &amp; Hill, 1978, pp. 60-61)</p> <p>"It is believed that the ITV crewmembers recognized the essential ambiguity of the SL's role in the mechanized and antitank employment doctrine and (in essence) recommended that he be trained accordingly." (Mock &amp; Hill, 1978, pp. 60-61)</p> <p>"Platoon, section and SLs should be taught the basics of how the system functions, should be able to perform the task functions and should be able to perform the tasks required of all crew members. Without this knowledge and ability, they will not be as effective as desired." (Rushton et al., 1978, p. 7)</p>
0.25	<p><b>External radio antenna interference with missile launcher load/unload.</b></p> <p>"The proximity of the antenna mast to the missile rack resulted in extreme difficulty in the extraction of a missile from the top right of the rack which occasionally resulted in the disruption of communications when the antenna lead was accidentally knocked loose from the antenna mast." (Mock &amp; Hill, 1978, p. 70)</p> <p>"The antenna should be relocated because it interferes with the launcher operation unless it is tied down." (Rushton et al., 1978, p. 817)</p>
0.00	<p><b>Crewmember access to the smoke grenade launcher switch.</b></p> <p>"The driver and gunner do not have access to the smoke grenade launcher switch." (Rushton, Howard, Corbett, Engel &amp; McCool, 1978, p. 817)</p>
0.00	<p><b>Operating the radio from the squad leader's seat.</b></p> <p>"The squad leader, or track commander's station, as it is presently placed, calls for a "contortionist, or a double jointed soldier" to operate the radio. It is to his rear, above the left track of the ITV. A seat reversal placing the squad leader with his back against the driver's seat would give him forward access to the radio." (Rushton et al., 1978, p. 819)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Gunner - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
2.50	<p>Eye strain from using a single eyepiece.</p> <p>"Gunner eye piece should be of the double eye piece type to reduce eye strain." (Rushton et al., 1978, p. 817).</p> <p>"Gunnery reported eye tiredness when using both the TOW day and TOW night sights for long periods of time." (Hammond &amp; Redden, 1984, p. 52).</p>
2.50	<p>Exposure while firing the machinegun.</p> <p>"The arrangement and performance of the secondary armament is considered operationally adequate except for the excessive exposure of the gunner due to the position of the gunner's seat." (Mock &amp; Hill, 1978, p. 32)</p> <p>"The M60 is also very limited in field of action, difficult to traverse on the ring and the gunner is vulnerable when using it. If the gunner stands in the seat, he is too high; if he stands on the deck, he is probably too low and the gunner's seat is in the way." (Rushton et al., 1978, p. 792)</p> <p>"When employing the secondary armament it was observed that the gunner would be highly exposed to fire to the front and sides of the ITV. The ITV TOW launcher provides some cover to the gunner from the rear of the vehicle." (Corbett et al., 1979, p. v)</p> <p>"Gunner exposure while firing the secondary armament was perceived as a serious problem." (Corbett et al., 1979, p. x)</p> <p>"The gunner must expose himself from the waist up for effective employment of the secondary armament." (Mock et al., 1979, p. iv)</p> <p>"Problems noted for the machine gun were: inability to cover all areas of fire, things in the way of operation, serious over exposure of the gunner while using the weapon..." (Smith et al., 1980, p.23)</p>
2.25	<p>Brass being deflected to the inside of the vehicle during machinegun operations.</p> <p>"Beyond 90 degrees, the expended casings began striking the erect weapons hatch until at 180 degrees on the right side of the rail, the cartridges were discharged directly at the gunner." (Robinson et al., 1978, p. 36)</p>
2.25	<p>Inability to turn night sight on and off.</p> <p>"The remote controls for the AN/TAS-4 night sight are unsatisfactory." (Mock &amp; Hill, 1978)</p> <p>"The night sight remote controls severely limit the effectiveness of the AN/TAS-4 night sight. ...Additionally a remote on-off switch would be highly desirable to conserve coolant bottle life. The latter appears prudent in light of the player consensus that this sight will be used as a surveillance device as well as an acquisition sight." (Rushton et al., 1978, p. xviii)</p> <p>"The current shortcoming in the [night] sight is the ineffectiveness of the remote adjustment controls. They simply did not work..." (Smith et al., 1980, p. 45)</p>
1.75	<p>Amount of "deadband" in the hand controls.</p> <p>"'Deadband' was noticed but it could be compensated for by all gunners." (Rushton et al., 1978, p. 822)</p> <p>"Lack of response near the neutral position of the turret controller (deadband) has bothered some of the crewmen." (Smith et al., 1980, p. 56)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Gunner - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
1.75	<p>Being too high in the hatch while standing on the gunner's seat.</p> <p>"The individual occupying the gunner's station must either stand on the seat to look out the open hatch which exposes him from the waist up, or kneel on the seat to look out the open hatch. The kneeling position cannot be maintained for any length of time." (Mock &amp; Hill, 1978, pp. 33-34)</p> <p>"The M60 is also very limited in field of action, difficult to traverse on the ring and the gunner is vulnerable when using it. If the gunner stands in the seat, he is too high; if he stands on the deck, he is probably too low and the gunner's seat is in the way." (Rushton et al., 1978, p. 792)</p>
1.50	<p>Tracking while heatwaves visible.</p> <p>"All sights suffer image degradation when used in inclement weather." (Smith et al., 1980, p. 45)</p> <p>"Excessive heat from the engine exhaust interferes with the night sight operation." (Rushton et al., 1978, p. 817)</p>
1.50	<p>Fogging of image transfer assembly.</p> <p>"In summer operations crew members noted that the lens apertures on the CVD and the gunner's sight fog as a result of body heat." (Rushton et al., 1978, p. 827)</p> <p>"Although this failure [seals] caused no problems, a high humidity environment could cause fogging of the lower ITA when the unit is not properly sealed." (Robinson, 1978, p. 3)</p> <p>"There were also numerous complaints about moisture in the Image Transfer Assembly..." (Hammond &amp; Redden, 1984, p. 48)</p> <p>"The Image Transfer Assembly (ITA) suffered at one point from fogging due to weather changes." (Smith et al., 1980, p. 45)</p>
1.50	<p>Red lights indicating "warnings" as well as "go" conditions.</p> <p>"GO lights should be green to avoid confusion." (Rushton et al., 1978, p. xv)</p> <p>"Green panel lights for conditions in the turret control panel were suggested." (Rushton et al., 1978, p. 819)</p>
1.50	<p>Reading the azimuth indicator while traversing the turret.</p> <p>"The ITV gunner, in order to use the azimuth information provided, would have had to take his eye from the sight and traverse the turret to the correct azimuth." (Rushton et al., 1978, p. 28)</p>
1.50	<p>Covering the necessary area with the machinegun.</p> <p>"The M-60 machinegun was perceived as a problem because of its limited firepower, and for those vehicles equipped with the commander's viewing device, the use of 100 round belts." (Rushton et al., 1978, p. xv)</p> <p>"The machinegun is felt to be too light to be effective for anything but immediate local security. A caliber 50 machinegun is considered to be more suitable for the mechanized infantry role." (Rushton et al., 1978, p. 791)</p> <p>"The M60 is also very limited in field of action, difficult to traverse on the ring and the gunner is vulnerable when using it." (Rushton et al., 1978, p. 792)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Gunner - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
	<p>"The gunners field of fire are limited by the gunner's hatch, the squad leaders's periscope and the TOW launcher." (Corbett et al., 1979, p. v)</p> <p>"The machinegun field of fire is considerably less than the desired 360 degrees." (Robinson et al., 1978, p. 36)</p>
1.25	<p><b>Not being able to see who or what is on top of the vehicle.</b></p> <p>"During the tests the gunners never indicated reliance on the turret vision blocks for outside observation." (Smith et al., 1980, p. 46)</p> <p>"Limitations to overall crew visibility restrict the engagement potential of the system." (Smith et al., 1980, p. 46)</p>
1.25	<p><b>Sliding off the gunner's seat while moving.</b></p> <p>"The gunner's seat is not stable during open hatch movement and needs to be braced." (Rushton et al., 1978, p. 817)</p>
1.25	<p><b>Blind spots when the launcher is stowed.</b></p> <p>"The gunner, or squad leader in the turret has his field of view blocked by the launcher assembly when in the stow position." (Mock &amp; Hill, 1978, p. 67)</p> <p>"The crew suffers visibility problems in the closed hatch mode and during movement in the high stow." (Rushton et al., 1978, p. xv)</p> <p>"The field of fire is limited by the CVD, the launcher, and the driver and gunner's hatches in some situations." (Rushton et al., 1978, p. 791)</p> <p>"The crew suffers visibility problems. The gunner, or squad leader in the turret has his field of view blocked by the launcher assembly." (Rushton et al., 1978, p. 820)</p> <p>"With the hatch open soldiers had clear vision to the front, but the launcher obstructed vision to the sides and rear." (Smith et al., 1980, p. 23)</p>
1.00	<p><b>Adjusting the night sight.</b></p> <p>"Hitting performance of the TOW at night was unsatisfactory because of the absence of a range focus remote control, and the inadequacy of the brightness and contrast remote controls." (Mock &amp; Hill, 1978, p. 8)</p> <p>"With regard to night sight remote controls it was observed that the ITV kit remote controls do not allow the gunner to fine tune the night sight for sufficient clarity to assure target identification in all range bands and to obtain the same hit performance as the day sight/tracker mounted on the ITV." (Rushton et al., 1978, p. viii)</p> <p>"Difficulty making adjustments in brightness, contrast and field of view on the night sight was stated as a major problem." (Rushton et al., 1978, p. xv)</p> <p>"The night sight remote controls severely limit the effectiveness of the AN/TAS-4 night sight. The remote controls should provide fully functioning contrast, brightness and field of view controls as well as a remote range focus." (Rushton et al., 1978, p. xviii)</p>
1.00	<p><b>Accessing and using the Missile Guidance Set.</b></p> <p>"The current location of the TOW Missile Guidance System (MGS) under the gunner's seat has contributed to its being easily damaged, makes it difficult to read, and it interferes with the location of the squad leader's seat." (Mock &amp; Hill, 1978, p. 66)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Gunner - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
	"The Missile Guidance System (MGS) is exposed at the turret base to damage from loose equipment and from crewmembers accidentally kicking it." (Smith et al., 1980, p. 44)
1.00	Operating machinegun.  "The M60 is also very limited in field of action, difficult to traverse on the ring and the gunner is vulnerable when using it." (Rushton et al., 1978, p. 792)
1.00	Operating control panel switches while using sights.  Minor problem (Smith et al., 1980, p. 24).
1.00	Reading azimuth indicator in the dark.  "Gunner needs an illumination system for the turret azimuth indication. The reload position is not adequate." (Rushton et al., 1978, p. 817)
1.00	Operating turret in the dark.  "Gunner needs an illumination system for the turret azimuth indication. The reload position is not adequate." (Rushton et al., 1978, p. 817)
1.00	Operating turret when backup hydraulic pump is being used.  "This system [manual backup] required the efforts of all of the crew members to pump up accumulator pressure and maintain that pressure during tracking. Further, the two live missiles that were fired using backup power resulted in target misses. These misses were attributed by the crews to a lack of accumulator pressure." (Rushton et al., 1978, p. viii)
0.75	Hazards during high/low temperature operations.  "Drivers and section leaders did not know how to shut down the personnel heater. The heater is necessary for cold weather operation because the turret hydraulic system becomes sluggish or inoperative in cold temperatures. Improper operation can cause maintenance problems to develop. An inoperative heater is not currently a "dead line" item in the operator's manual." (Hammond, 1985, p. 12)  "Because of the failed slew brake [a high-temperature related failure], all azimuth operation was with the tracking brake. All of the components can be easily touched by the gunner. MIL-HDBK-759 indicates that temperatures of 180 degrees F will produce second-degree burns with 30 second contact,... This indicates a need for warning signs, shielding of hydraulic components, and protective clothing, such as gloves, for the gunner when operating in high-temperature environments." (Robinson et al., 1978, p. 69)
0.75	Tracking in dust, smoke and haze conditions.  "The optics (CVD and Sight aperture) fogged in the summer heat as a result of exposure to the body moisture of crew members. In general, optics were sensitive to moisture, dust, and mud. Sight lenses required cleaning prior to use in many of the field experiences the gunners had. Dust obscured the gunner's sight and the CVD twice during OT III, Phase B, live fire tests." (Smith et al., 1980, pp. 45-46)
0.75	Loading and reloading the machinegun.  "There were no problems reported by either of the two gunners in regard to the following:...reloading the M60 machinegun while remaining in the weapons station." (Fletcher et al., 1977, pp. 2-38)

# HUMAN FACTORS ISSUES (CON'T)

## Gunner - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
	"The M60 is in the way. The squad leader may use it as a missile guide during reload. It has been hit while throwing the expended missiles out during reload. It is also very limited in field of action, difficult to traverse on the ring and the gunner is vulnerable when using it. If the gunner stands on the seat, he is too high; if he stands on the deck, he is probably too low and the gunner's seat is in the way." (Smith et al., 1980, p. 56)
0.75	Putting machinegun into operation or stowing.  "There were no problems reported by either of the two gunners in regard to the following:... aiming the M60 machine gun in the open-hatch mode..." (Fletcher et al., 1977, pp. 2-38)
0.75	Adequacy of the night sight remote control.  "The remote controls for the AN/TAS-4 TOW night sight are unsatisfactory." (Mock & Hill, 1978, p. 72)  "Night sight remote controls were viewed as being useless." (Rushton et al., 1978, p. xv)  "Because of inadequacy of the remote controls, the night sight is not considered to be fully integrated with the ITV (a critical issue)." (Robinson et al., 1978, p. 61)
0.50	"Satisfying the lights" on the control panel before being able to alter operations on the control panel.  This issue was included based on observations made during this research.
0.50	Confusion with lights on the control panel.  "Green panel lights for conditions in the turret control panel were suggested." (Rushton et al., 1978, p. 819)
0.50	Reading azimuth indicator as eyes adjust to outside light level.  "Unfortunately, the turret azimuth must be read from a pointer on the ring that is particularly difficult to see with the eye adjusted to outside light conditions. Compounding this difficulty is the lack of a launcher elevation indicator within the turret." (Mock & Hill, 1978, p. 28)
0.50	Focusing the night sight.  "The night sight remote controls severely limit the effectiveness of the AN/TAS-4 night sight. The remote controls should provide fully functioning contrast, brightness and field of view controls as well as a remote range focus." (Rushton et al., 1978, p. xviii)
0.50	Standing on the gunner's seat during travel.  "Riding while standing at the gunner's station presented a constant bumping situation for the sight aperture." (Rushton et al., 1978, p. 819)  "Gunner control switches are subject to being activated when the gunner is standing in his seat during open hatch operations." (Hammond & Redden, 1984, p. 50)
0.25	Operating trigger switches with thumbs vs. index fingers.  This issue was included based on observations made during this research.
0.00	Operating slew switches with index fingers instead of thumbs.  This issue was included based on observations made during this research.

# HUMAN FACTORS ISSUES (CON'T)

## Driver - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
2.50	<p>Seeing through the driver's periscope at night when buttoned up.</p> <p>"The IR periscope was not frequently used by the drivers. They considered it hard to focus and to interfere with depth perception." (Hammond &amp; Redden, 1984, p. 52)</p>
2.25	<p>Driving at night with the blackout lights.</p> <p>"The majority of the drivers reported a reluctance to drive with the hatches closed, day or night. Even with the hatches open, they complained of blind spots to the right and rear of the vehicle." (Hammond &amp; Redden, 1984, p. 52)</p>
2.00	<p>Seeing through the driver's periscope when in glare.</p> <p>"The majority of the drivers reported a reluctance to drive with the hatches closed, day or night. Even with the hatches open, they complained of blind spots to the right and rear of the vehicle." (Hammond &amp; Redden, 1984, p. 52)</p>
2.00	<p>Reaching components while working on engine compartment.</p> <p>"Design for maintainability problems encountered were: (a) inadequate working space between the weapon station and the rear engine access..." (Dailey, Powell, &amp; Hulcy, 1979, p. 5)</p>
1.75	<p>Driving with the launcher erect.</p> <p>"The drivers have limited vision to their right and rear." (Mock &amp; Hill, 1978, p. 67)</p> <p>"Drivers were concerned about the speed limitation they faced if they had to relocate the ITV with the launcher in the erect position." (Smith et al., 1980, p. 46)</p>
1.75	<p>Seeing behind the vehicle.</p> <p>"The drivers have limited vision to their right and rear." (Mock &amp; Hill, 1978, p. 67)</p> <p>"The crew suffers visibility problems. The drivers have limited vision to their right and rear." (Rushton et al., 1978, p. 820)</p> <p>"Even with the hatches open, they complained of blind spots to the right and rear of the vehicle." (Hammond &amp; Redden, 1984, p. 52)</p>
1.25	<p>Reaching any controls.</p> <p>"There were also comments that the seat should move forward more so it would be easier for the driver to reach the controls." (Hammond &amp; Redden, 1984, p. 51)</p>
1.25	<p>Powering down the radios to start the vehicle.</p> <p>"...adequate except for the following deficiencies: The absence of a single control switch (or circuit breaker) for turning off the radios prior to starting the vehicle engine of the ITV." (Mock &amp; Hill, 1978, p. 34)</p> <p>"All radios must be turned off before starting the engine on the M113A1 causing delays awaiting verbal confirmation that the radios are turned off. A single master switch or circuit breaker located near the driver would expeditiously correct this situation. This requirement presents a potential for damage to ITV communications equipment." (Mock &amp; Hill, 1978, p. 35)</p>
1.25	<p>Seeing with the launcher in the stowed position.</p> <p>"The crew suffers visibility problems in the closed hatch mode and during movement in the high stow." (Rushton et al., 1978, p. xv)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Driver - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
1.00	Weapons being fired near your hatch. Minor problem (Smith et al., 1980, p. 30).
1.00	Coordinating with the gunner when the SL is dismounted. Minor problem (Smith et al., 1980, p. 30).
0.75	Observing all controls/displays to drive. "The instrument panel was considered adequate but it should be located further to the left side of the hull for easier viewing." (Smith et al., 1980, p. 46)
0.75	Seeing through driver's periscope in daylight when buttoned up. "The crew suffers visibility problems in the closed hatch mode and during movement in the high stow." (Rushton et al., 1978, p. xv)
0.50	Reading any visual display. "The instrument panel was considered adequate but it should be located more to the left side of the vehicle. In a new location the panel would be easier to view from the raised driving position." (Rushton et al., 1978, p. 821)
0.50	Operating any controls. "There were also comments that the seat should move forward more so it would be easier for the driver to reach the controls." (Hammond & Redden, 1984, p. 51)
0.50	Confusing fuel cutoff control and hand throttle. This issue was included based on observations made during this research. The fuel cutoff control and hand throttle are located next to each other and look exactly alike (see <u>Operator's Manual</u> , pp. 2-9).
0.50	Steering the vehicle. Minor problem (Smith et al., 1980, p. 29).
0.50	Operating the brakes. "The driver responses are primarily a result of the greater weight of the ITV as compared to the M113A1. The automotive subtest results verify a decrease in top speed, acceleration, and braking capabilities." (Robinson et al., 1978, p. 67) "A caution should be provided in the manual to the effect that the ITV stopping distances are greater than those of the M113A1." (Robinson et al., 1978, p. 139)
0.50	Knowing where the launcher is pointed relative to vehicle front. Minor problem (Smith et al., 1980, p. 30).
0.25	Operating the transmission. Minor problem (Smith et al., 1980, p. 29).



## HUMAN FACTORS ISSUES (CON'T)

### Driver - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
0.25	<p>Center of gravity in the vehicle.</p> <p>"The ITV frequently had to seek alternate routes during advancing maneuvers. The squad leader must be concerned with this vehicular shortcoming when determining how to perform his mission most effectively. The vehicle, because of its weight and higher center of gravity, is simply not as maneuverable as an M113A1. The ITV is faced with a 5 MPH speed limitation when the launcher is in the erect position. This limitation, coupled with the time required to stow the launcher hinders rapid withdrawal to a secondary firing position. It also adds time to any bounding overwatch maneuver for the ITV." (Smith et al., 1980, p. 43)</p> <p>"However, there was a widespread feeling that more care had to be taken with ITVs in climbing and crossing steep slopes as the ITV is top heavy and turns over more easily than the M113. Some of the sample battalions had experienced accidents where ITVs had turned over in these situations." (Hammond &amp; Redden, 1984, p. 53)</p>
0.25	<p>Seeing with the hatch popped-up.</p> <p>"Pop-up hatches for the driver and gunner have potential for enhancing reconnaissance operation, however, openings of greater than 6 inches and/or use of a domed driver's hatch would increase their usefulness." (Fletcher et al., 1977, pp. 1-8)</p>
0.25	<p>Driving at night with the headlights.</p> <p>Minor problem (Smith et al., 1980, p. 29).</p>
0.25	<p>Adequacy of pitch/cant indicators in driver's compartment.</p> <p>"The cant indicator in the driver's compartment was not difficult to use but was not considered a significant aid in positioning the vehicle in a suitable firing position." (Rushton et al., 1978, p. 820)</p>
0.25	<p>Operating the turret during dismount operations.</p> <p>"The driver needs gunnery training on the turret mounted M60 machinegun for crew dismounted operations. Doctrine requires the ITV (M113) driver to provide M60 machinegun covering fires for the dismounted TOW crew with the M60 machinegun. However since this is different from the standard M113 doctrine, the crews considered it necessary that more training be provided in this area." (Mock &amp; Hill, 1978, p. 61)</p> <p>"The crews were concerned about the machinegun. Drivers had not been trained to operate the turret. This was their duty station during dismounted TOW drills. Their concern was that a change of fields of fire would require the transversing of the turret (if operational) or the dismounting of the machinegun." (Rushton et al., 1978, p. 791)</p>
0.00	<p>Getting the vehicle level enough to use the launcher.</p> <p>"The cant indicator in the driver's compartment was not difficult to use but was not considered a significant aid in positioning the vehicle in a suitable firing position." (Smith et al., 1980, p. 46)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Loader - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
2.00	<p><b>Adequacy of the missile latching system in assuring that the missile is loaded properly.</b></p> <p>"During loading, the final placement of the missile all the way into the launch tube is difficult. This may be due to the fact that some missiles had become damaged during practice." (Rushton et al., 1978, p. 792)</p> <p>"Analysis of the failure of round 19 indicates that the umbilical was partially connected and the holdback pin was properly positioned, but the missile was not properly latched. ... It is probable that the failure to properly seat the missile caused the misfires and the failure of round 19." (Robinson et al., 1978, p. 32)</p> <p>"Loaders were bothered by the locking system which held missiles in place on the launcher rails. There were failures in the mechanism which permitted missiles to disengage from the rails and cause misfires." (Smith et al., 1980, p. 47)</p>
2.00	<p><b>Having enough space to load the launcher.</b></p> <p>"A very small individual serving as a loader has difficulty with the boresighting of the sights in the launcher. Conversely, a very tall individual has difficulty loading the launcher or moving around in the open cargo hatch with the launcher in the high stow position, but finds boresighting a relatively simple task." (Mock &amp; Hill, 1978, p. 66)</p> <p>"Loaders cannot be very tall and must have strong upper bodies to accomplish rapid loading." (Mock &amp; Hill, 1978, p. 817)</p> <p>"Tall soldiers complain of constantly bumping their heads on vehicle components (i.e. hydraulic lines, etc.) and have greater difficulty loading missiles into the launch tube than do the shorter soldiers." (Hammond &amp; Redden, 1984, p. 50)</p> <p>"The TOW missile rack is difficult for some to access because of lack of space." (Hammond &amp; Redden, 1978, p. 50)</p>
2.00	<p><b>Making observations from the cargo hatch.</b></p> <p>"Observation by scouts (no more than 2) from the cargo hatch with the launcher in the high stow position is degraded by the launcher to their front and overhead, and the fold-down shields to the side; plus the potential for personal injury resulting from crew members striking each other, striking their head on the bottom of the stowed launcher, or striking the edge of the cargo hatch." (Mock &amp; Hill, 1978, p. 38)</p> <p>"Air guard and observation from the cargo hatch are almost impossible, even with the high stow launcher position. Observers are unable to stand upright and attempts to observe or navigate from the cargo hatch while traveling have not been practical." (Mock &amp; Hill, 1978, p. 67)</p> <p>"Although the ITV was modified to a high stow configuration to allow a scout/observer to observe to the flanks and rear when the vehicle is moving, it was found that observation in this configuration is degraded." (Rushton et al., 1978, p. viii)</p>
2.00	<p><b>Stowed tripod blocking right field of view.</b></p> <p>"The right rear vision block is seldom accessible to the crew because of tripod storage." (Mock &amp; Hill, 1978, p. 67)</p> <p>"The right rear vision block is seldom accessible to the crew because of tripod storage. (Infantry ITV)." (Rushton et al., 1978, p. 820)</p>

## HUMAN FACTORS ISSUES (CON'T)

### Loader - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
1.75	<p><b>Loading the ITV from inside the vehicle.</b></p> <p>"A very small individual serving as a loader has difficulty with the boresighting of the sights in the launcher. Conversely, a very tall individual has difficulty loading the launcher or moving around in the open cargo hatch with the launcher in the high stow position, but finds boresighting a relatively simple task." (Mock &amp; Hill, 1978, p. 66)</p> <p>"Loaders cannot be very tall and must have strong upper bodies to accomplish rapid loading." (Mock &amp; Hill, 1978, p. 817)</p> <p>"Tall soldiers complain of constantly bumping their heads on vehicle components (i.e. hydraulic lines, etc.) and have greater difficulty loading missiles into the launch tube than do the shorter soldiers." (Hammond &amp; Redden, 1984, p. 50)</p> <p>"The TOW missile rack is difficult for some to access because of lack of space." (Hammond &amp; Redden, 1978, p. 50)</p>
1.75	<p><b>Loading missiles at night.</b></p> <p>"Some loaders have trouble getting the missile on the launcher guide rails during reload at night." (Rushton et al., 1978, p. 792)</p> <p>"A light is needed over the missile storage rack to aid loaders during reload operations." (Rushton et al., 1978, p. 827)</p> <p>"One big problem is reloading at night. It's hard to line up the missile in the launch tube in the dark. If it's pitch black and all the lights are out like they're supposed to be, it's just guesswork to find the rails. It's not really a big problem, just time consuming; it takes time to reload at night." (Corbett et al., 1979, p. 215)</p>
1.75	<p><b>Noise in the vehicle during live fire.</b></p> <p>Minor problem (Smith et al., 1980, p. 34).</p>
1.50	<p><b>Closing and opening the cargo hatch.</b></p> <p>"The loader's cargo hatch is extremely difficult to close and often required more than one crew member to complete the task. The launcher cannot be moved from the reload position unless the cargo hatch is closed." (Mock &amp; Hill, 1978, p. 66)</p> <p>"The latch holding the cargo hatch door completely open does not release easily. It is also difficult to get hold of the latch handle." (Smith et al., 1980, p. 57)</p>
1.33	<p><b>Throwing missile casings out when side armor is erected.</b></p> <p>"The vertical steel plates on the top deck are in the way when throwing expended missiles out." (Rushton et al., 1978, p. 792)</p>
1.33	<p><b>Loading smoke grenade launchers.</b></p> <p>Minor problem (Smith et al., 1980, p. 34)</p>
1.33	<p><b>Loading missiles when the ITV is not level.</b></p> <p>Minor problem (Smith et al., 1980, p. 34)</p>
1.00	<p><b>Exposure when loading/unloading the launcher.</b></p> <p>"The backup system is usable as an emergency backup... Reload times using backup methods, although personnel are exposed, are still less than 30 seconds." (Robinson et al., 1978, p. 54)</p>

# HUMAN FACTORS ISSUES (CON'T)

## Loader - TOE Unit Soldiers

AVERAGE SCORE	ISSUE
1.00	<p>Danger loading/unloading ATWESS cartridges.</p> <p>This issue was included based on an analysis of safety reports involving the operation of the ITV between 1982 and 1988.</p>
0.75	<p>Throwing missile casings out right side of vehicle.</p> <p>"The M60 is in the way....It has been hit while throwing the expended missiles out during reload." (Rushton et al., 1978, p. 792)</p>
0.75	<p>Throwing missile casings out left side of vehicle.</p> <p>"The M60 is in the way....It has been hit while throwing the expended missiles out during reload." (Rushton et al., 1978, p. 792)</p> <p>"The loader often hit his hand between the machinegun traverse ring, or the machine gun stoppoint, and the discarded missile casing when discarding to the left." (Smith et al., 1980, p. 47)</p>
0.50	<p>Cargo hatch opening wide enough to load launcher easily.</p> <p>Minor problem (Smith et al., 1980, p. 34).</p>
0.00	<p>Using the intercom box in its present location.</p> <p>"The loader's communication connection interferes with missiles while loading is in progress. Loaders felt the communications control box should be placed to the right rear of the cargo hatch." (Smith et al., 1980, p. 47)</p> <p>"The loader's intercom box is placed inappropriately. In its present location the loader's connecting cord gets tangled with the missiles during loading and with other crewmen in the crew compartment." (Rushton et al., 1978, p. 819)</p>

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